FOUNDRY TRADE JOURNAL

EST. 1902

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JULY 7, 1960
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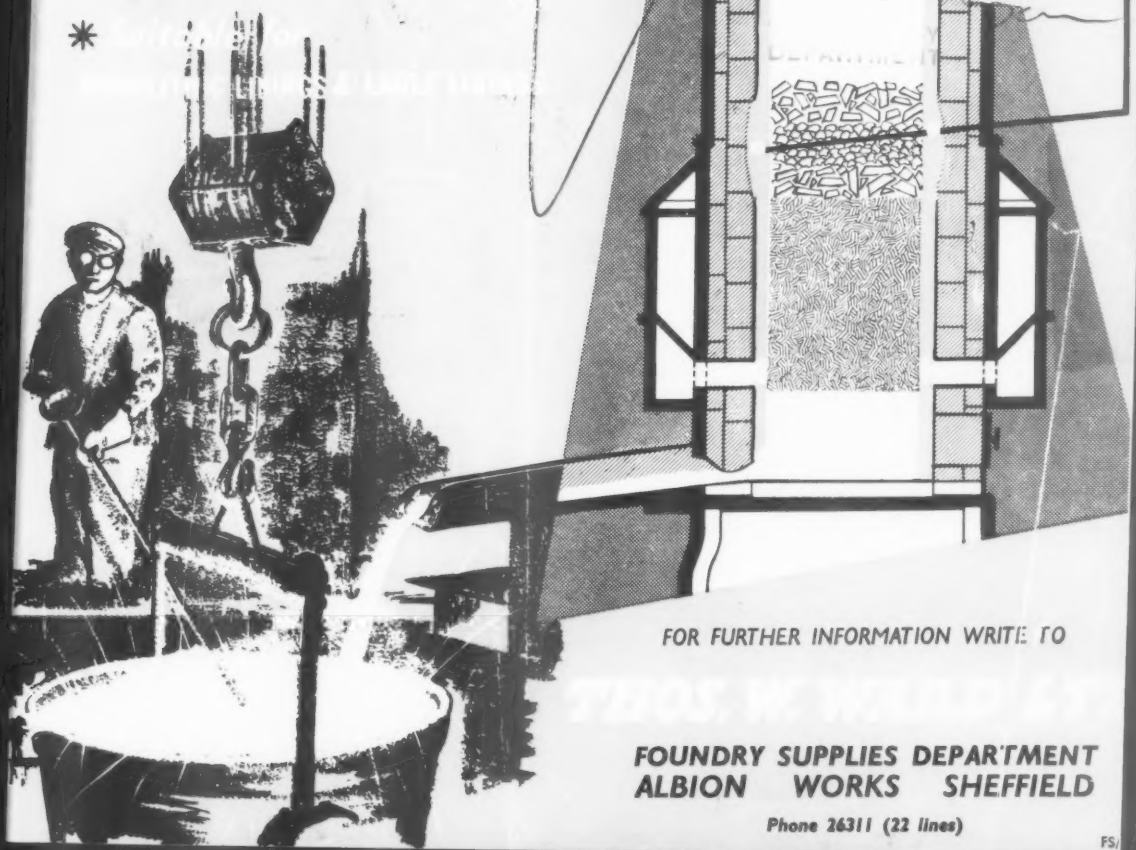
REDUCE

SHEFFIELD BLUE GANISTER



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A Series of dressings for gravity die casting, sand-mould and core dressings for steel, iron, copper based and aluminium alloys.
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Manufactured by

WE WANTED TO TELL YOU

about our dressings this week, but their use is so diversified we couldn't do justice to them in one advertisement so we invite you to send for this brochure. It's comprehensive and will tell you, in the nicest possible way, why we think you should:—

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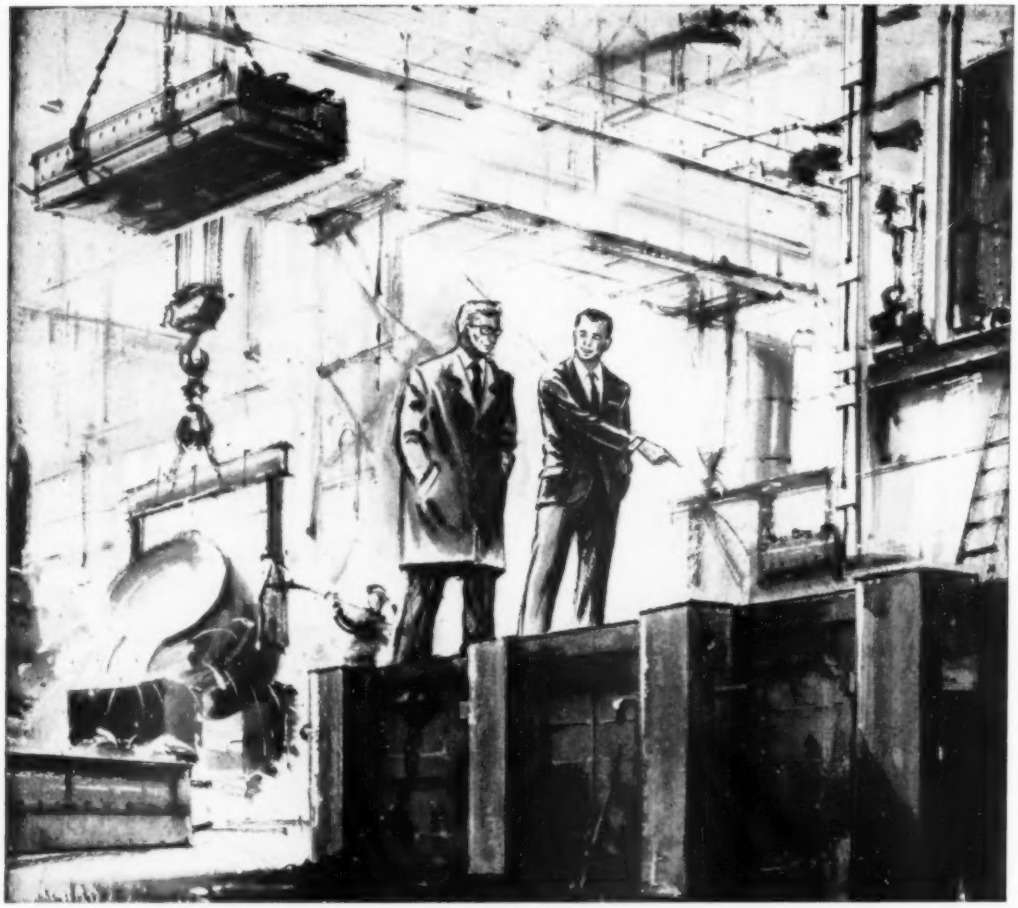

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We hope you have had the opportunity of talking about—and even seeing in practice—the use of our

NORWEGIAN OLIVINE SAND
AND
"CHEMPRODUX" BENTONITES

in Foundries concerned with

IMPROVED PRODUCTIVITY
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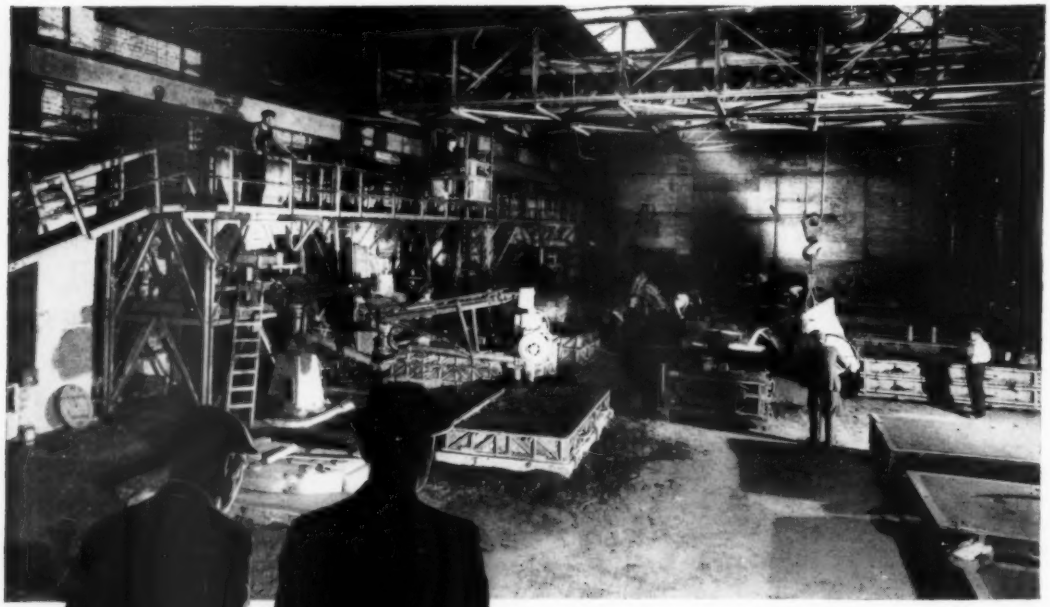

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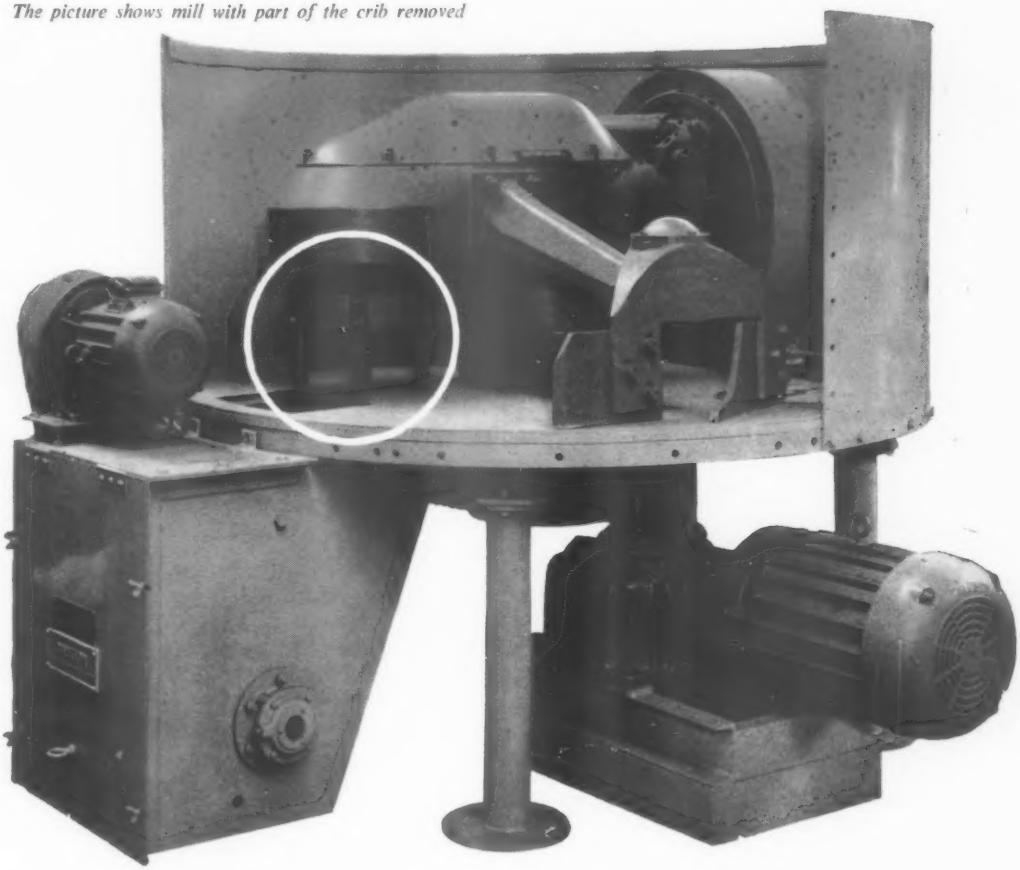

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Photographs by courtesy of
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Above:

View showing Wet type Spark Arresters with Inspection Platform serving 17-ton per hour Cupolas.

Left:

This highly efficient Spark and Dust Suppressor is provided with a Spray Jet giving double water curtain as illustrated.

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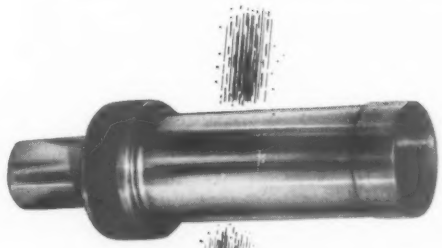
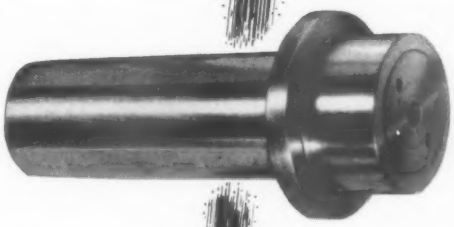
J.J.M.



Perfection!



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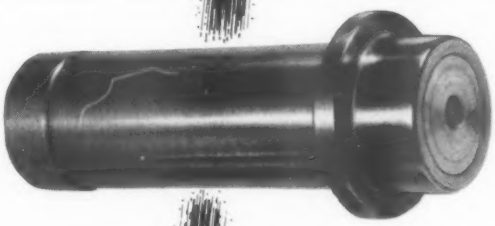

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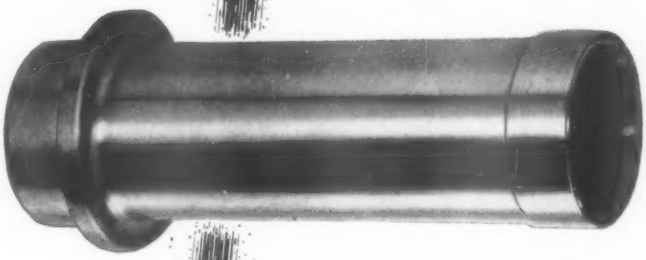

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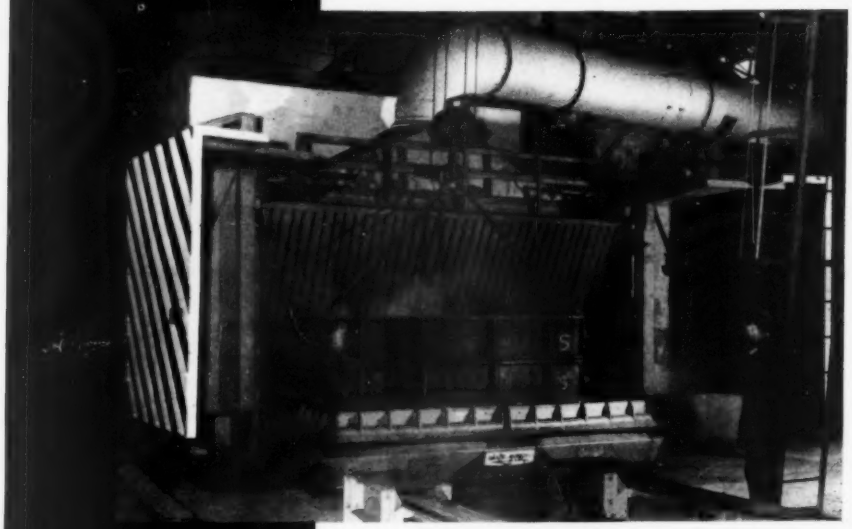
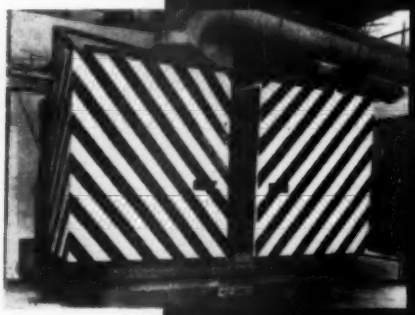
for dust collection and control



The photographs show the doors in both the open and closed positions.



An interesting feature of the Holmes-Schneible Multi-Wash installation in the steel foundry of English Steel Castings Corporation Limited are the hydro-pneumatically operated doors enclosing the shake-out hood. These doors which were designed in co-operation with English Steel Castings Corporation Limited, have been very successful in operation and have resulted in a considerable saving of exhaust volume necessary at the shake-out position. The installation is completed by two size 138 type 'JC' collectors, a dewatering tank, hoods on the sand preparation plant, fan and ducting.

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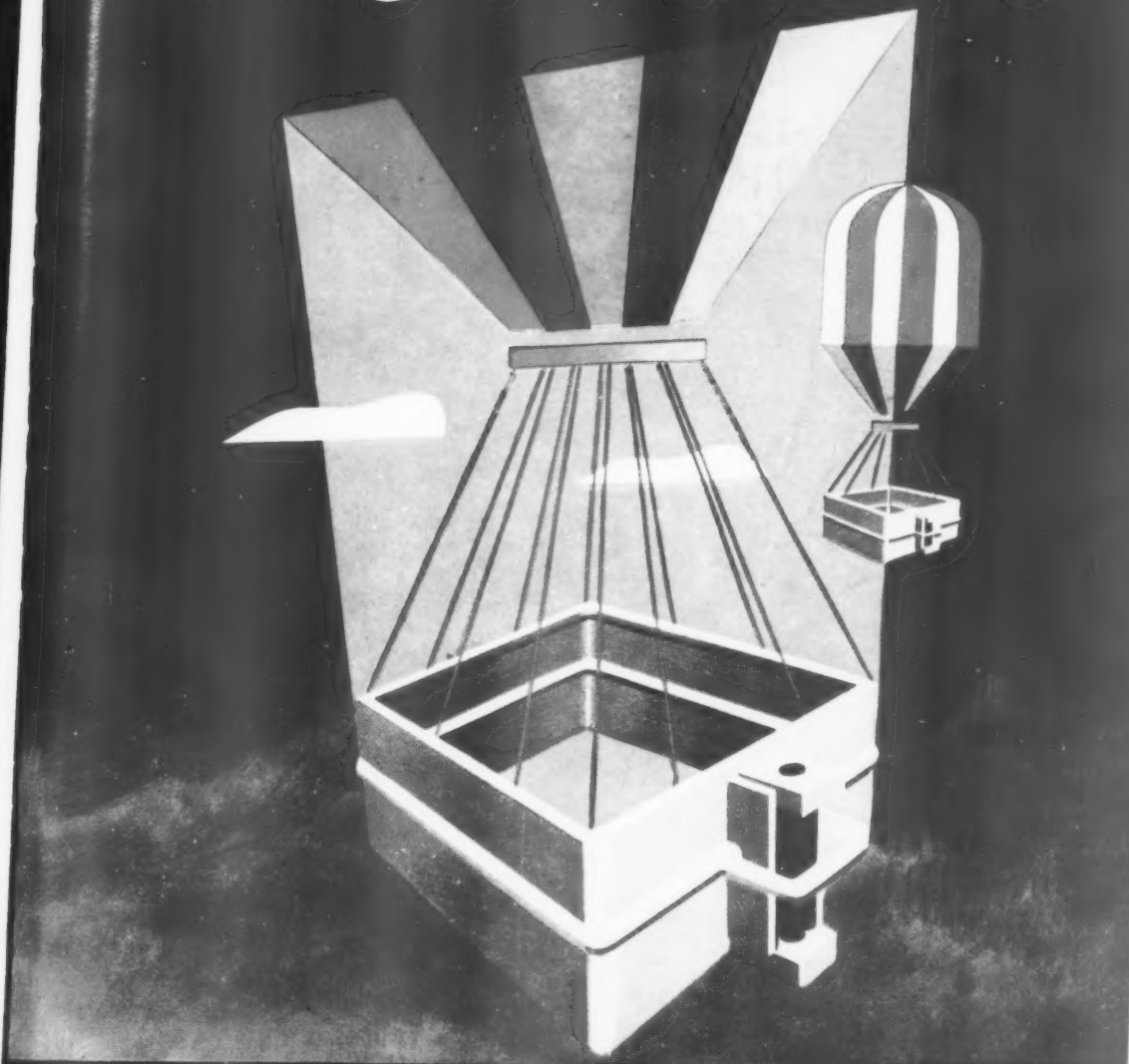

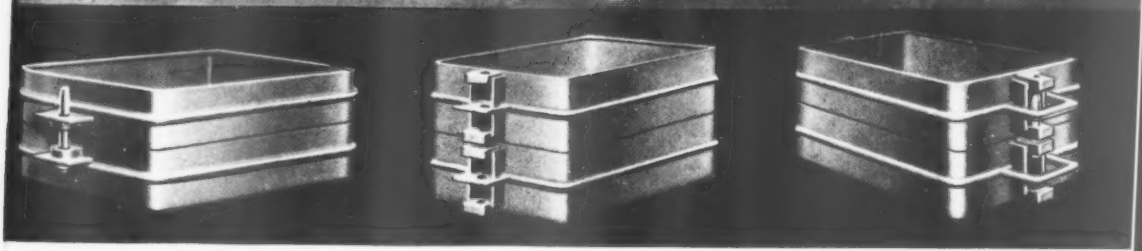

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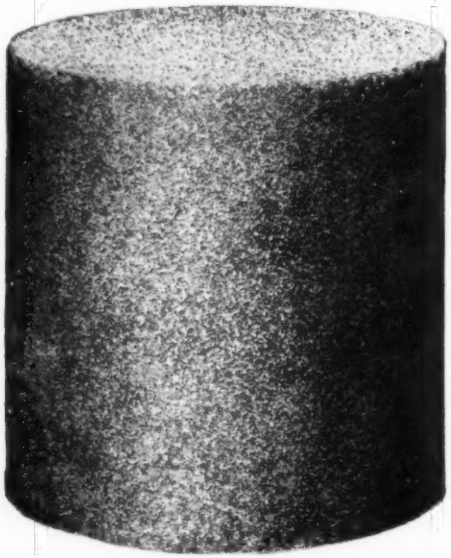

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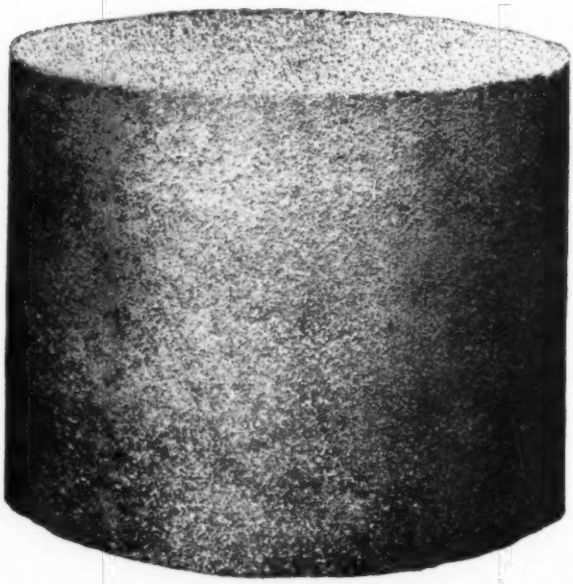

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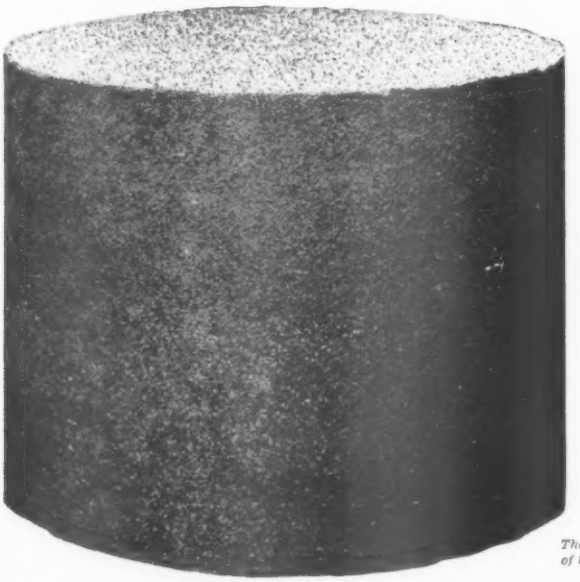

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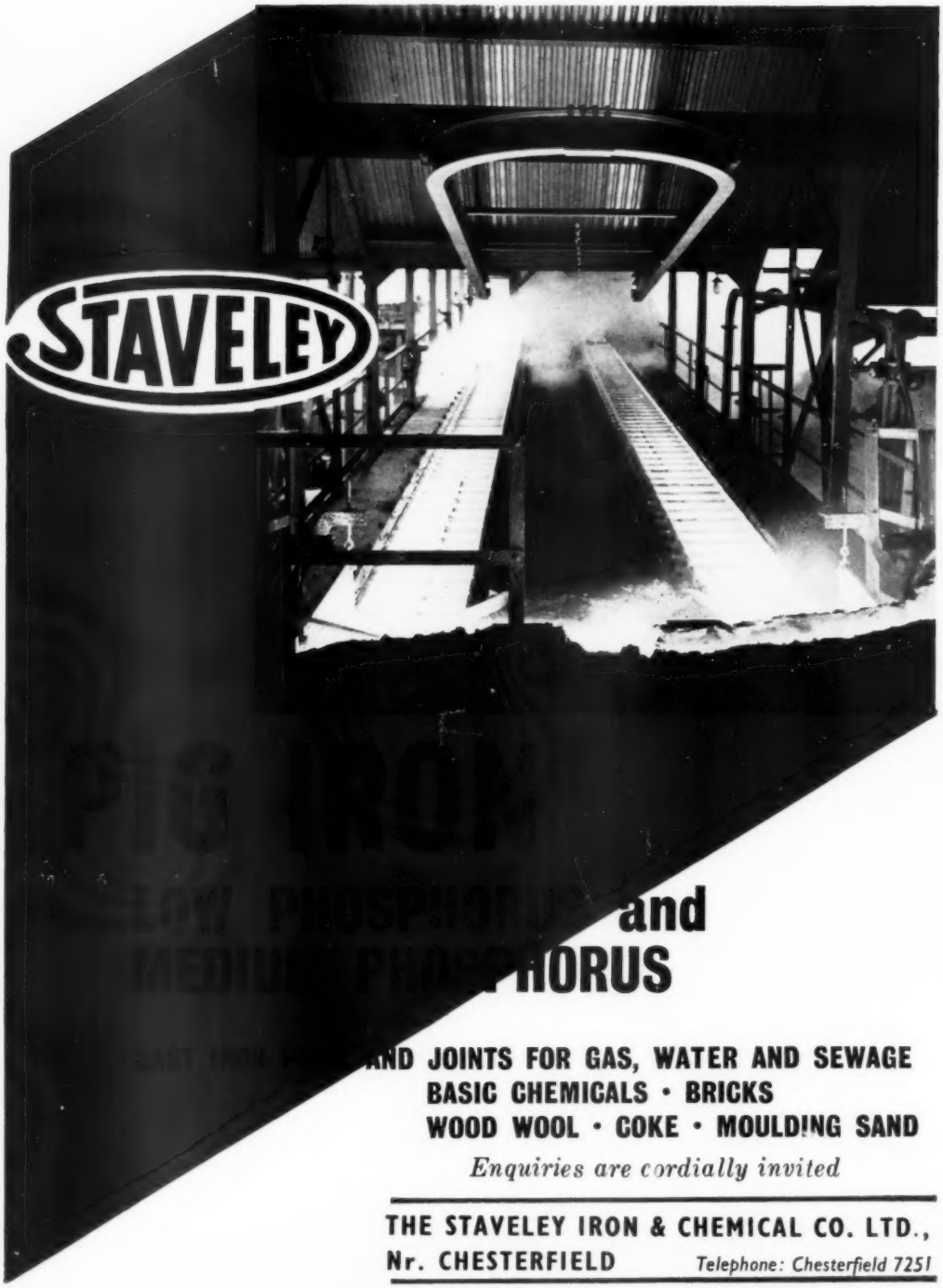

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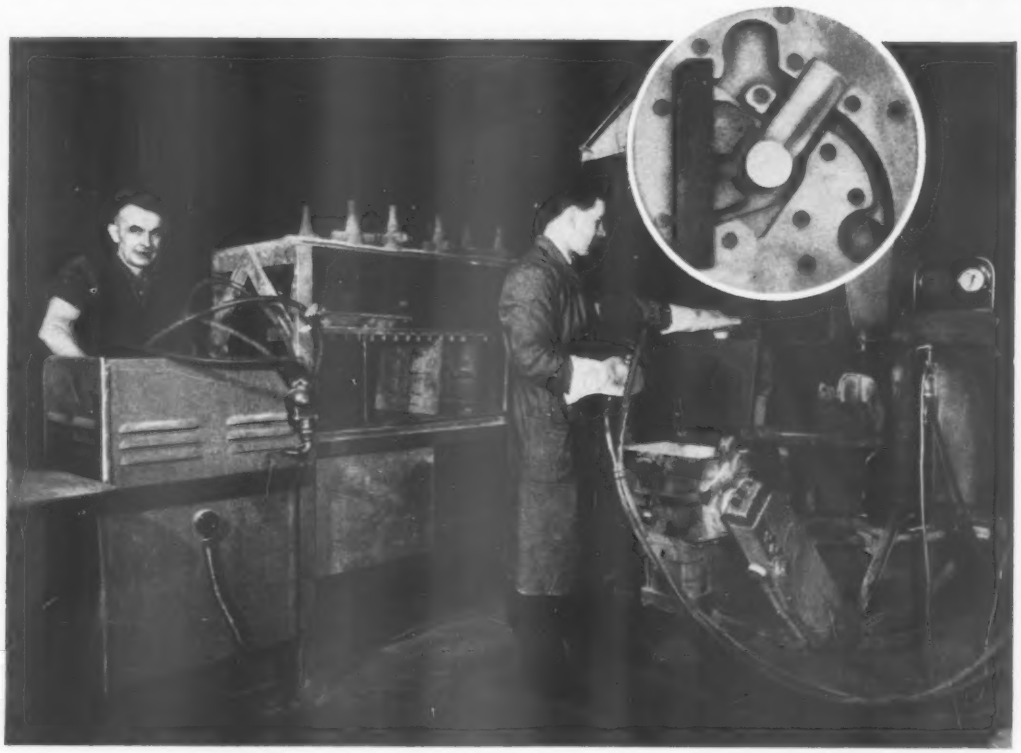
Another Polygram Installation at A.P.V.-Paramount Limited



Photograph of a section of the POLYGRAM Shell Moulding equipment installed at A.P.V.-Paramount Ltd., Crawley, Sussex.

A.P.V.-Paramount Ltd. obtain substantial cost reductions and machining economies Shell Moulding a wide range of stainless steel components for the Chemical, Brewery and Allied Industries.

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One of the Shell Moulded stainless steel castings incorporated in the manufacture of a Heat Exchanger. Photographs by Courtesy of A.P.V.-Paramount Ltd.

Polygram Casting Company have a competent and complete service to offer and your enquiries are invited.

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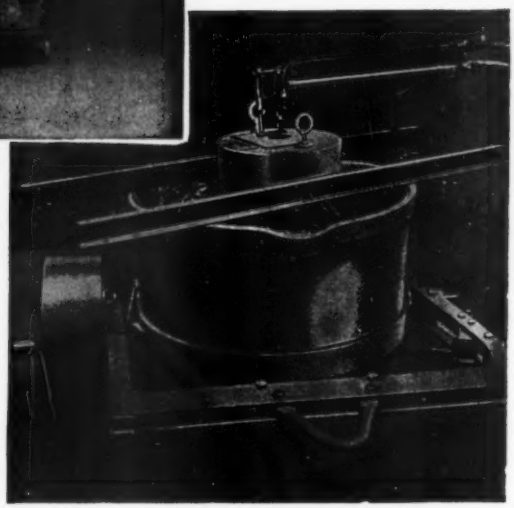
NEWSTAD Ladle Dryers provide the answers to a difficult foundry problem, speed and efficiency with economy



The Illustration above shows a Gas Fired Installation at the works of Messrs. Sterling Metals, Ltd., Coventry, used for Drying and Preheating Bogey Ladles.

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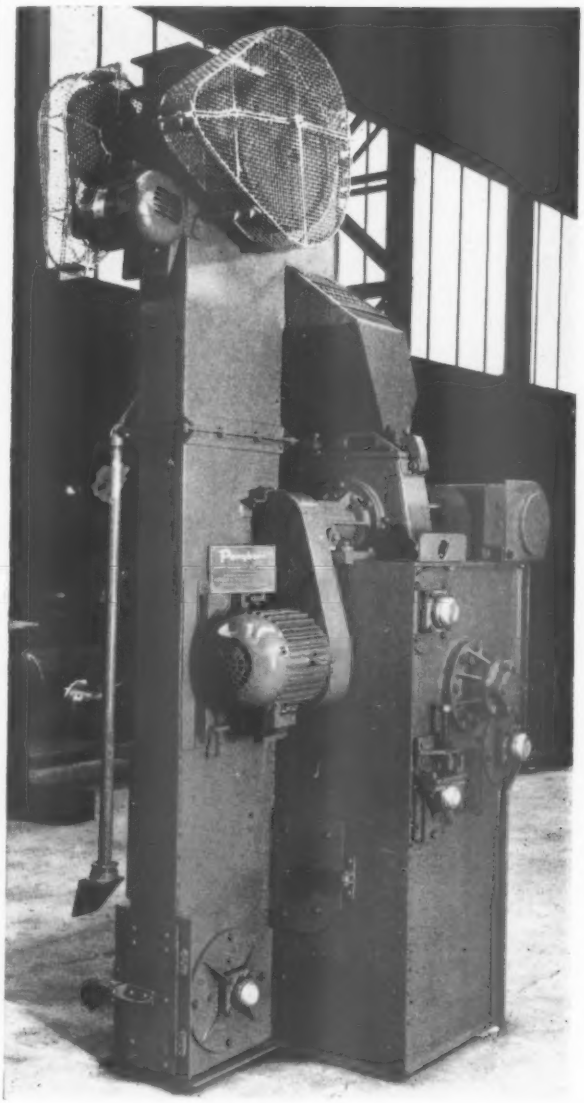

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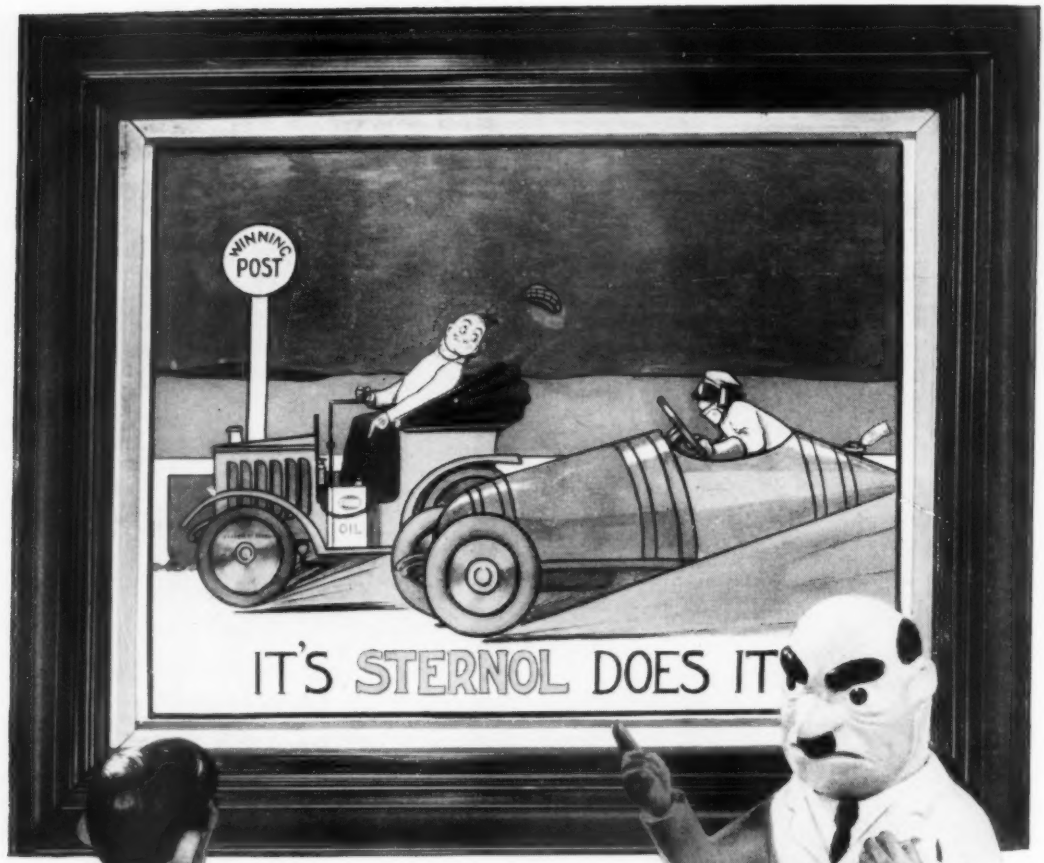

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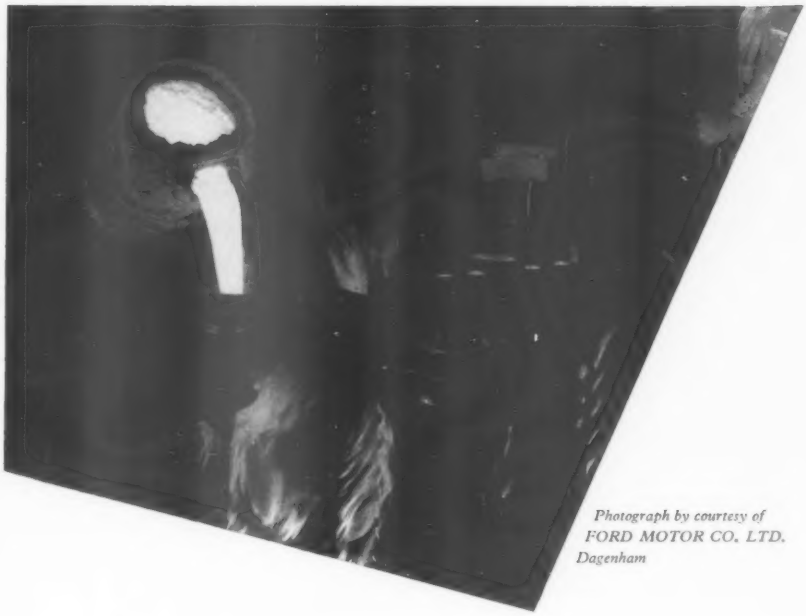

Photograph by courtesy of FORD MOTOR CO. LTD. Dagenham

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MAIDSTONE

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W146

Illustrated is part of a battery of five "Broomwade" stationary air compressors at the Derby Works of H & F Precise Castings Ltd.

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The "BROOMWADE" air compressors used by H & F Precise Castings Ltd. supply the air required to operate their wax injection machines. These machines produce the accurate wax patterns that are the first stage in the 'lost-wax' investment casting process for making high quality precision castings—castings that fulfil the exacting requirements of turbo-jet engines and also find many applications in the wider field of general industrial engineering especially where components of complex shapes are needed.

They also supply the air required to operate knock-out hammers, shot-blast equipment and small air-powered hand tools for finishing the castings.

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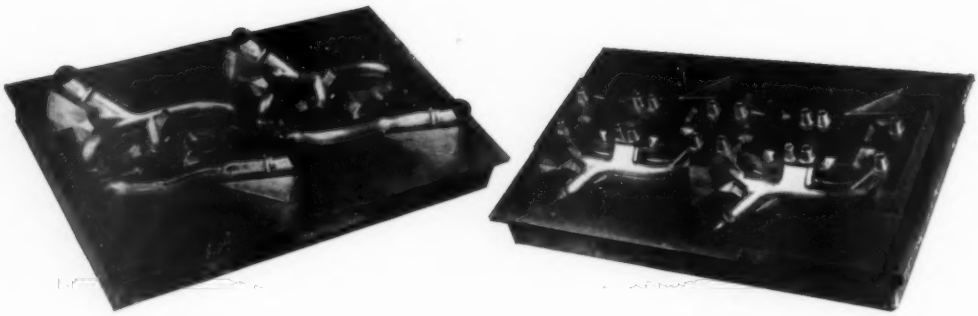

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burning
problem

solved
overleaf

SHELL

B

A poorly finished casting, rough and blemished, can lose an order — and a reputation. Protect both. Ensure first-class finish with Foseco inflammable mould and core dressings. They are consistent. They are *not* expensive. They burn smoothly and evenly. They result in best possible finish. And one of the reasons why Foseco 'fired' dressings achieve such consistently good results is that they contain Shell I.P.S. — isopropyl alcohol — the ideal solvent.

This grey iron casting was produced by Bodley Bros. & Co. Ltd. of Exeter. Machined, it weighs 5 tons 6 cwt. Diameter is 12' 6". Teeth are 15 inches wide. Foseco Flamco and Shell I.P.S. were used for dressing the mould and cores. Flamco is the finest graphite dressing in powder form: I.P.S. is top quality isopropyl alcohol.

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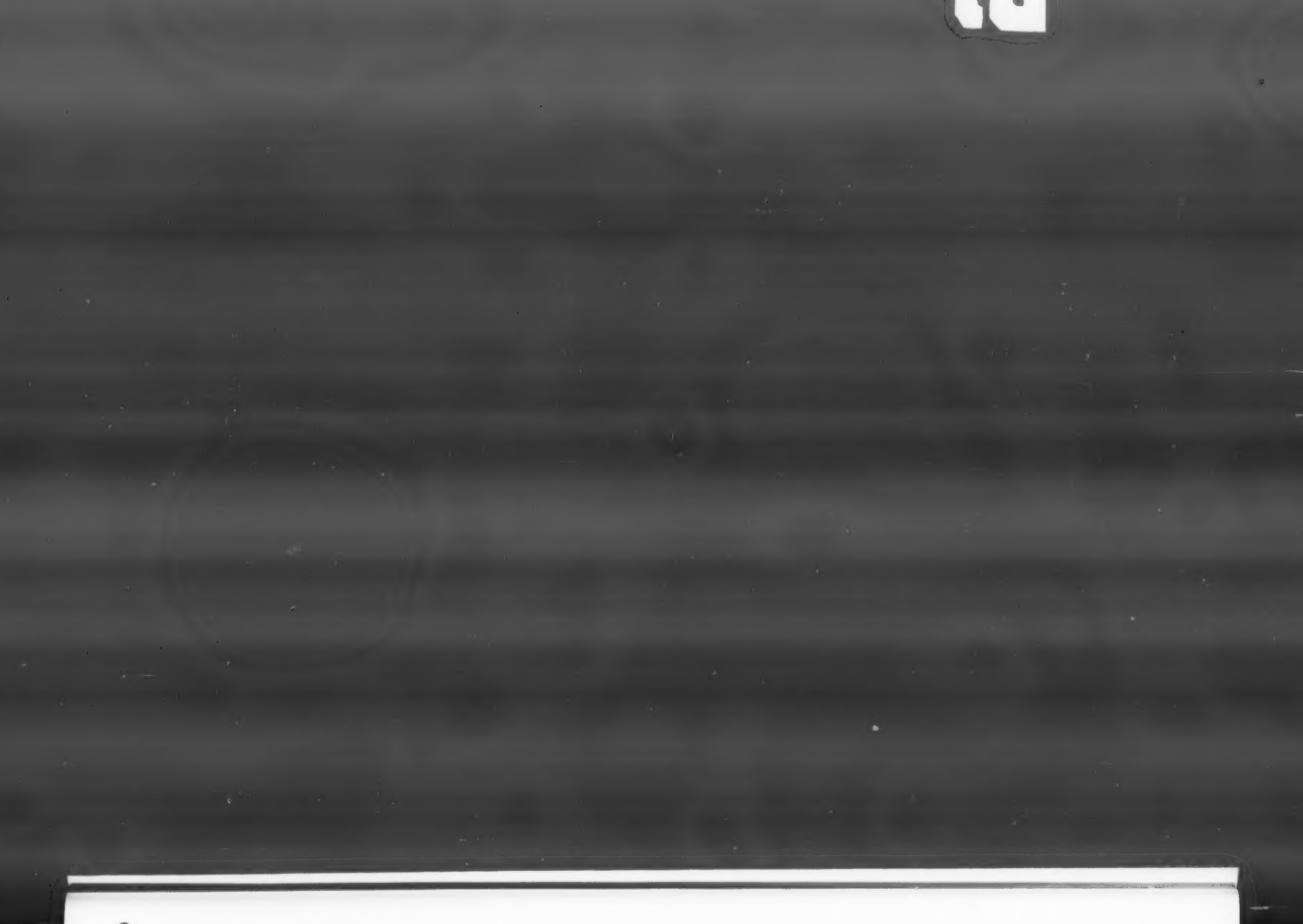
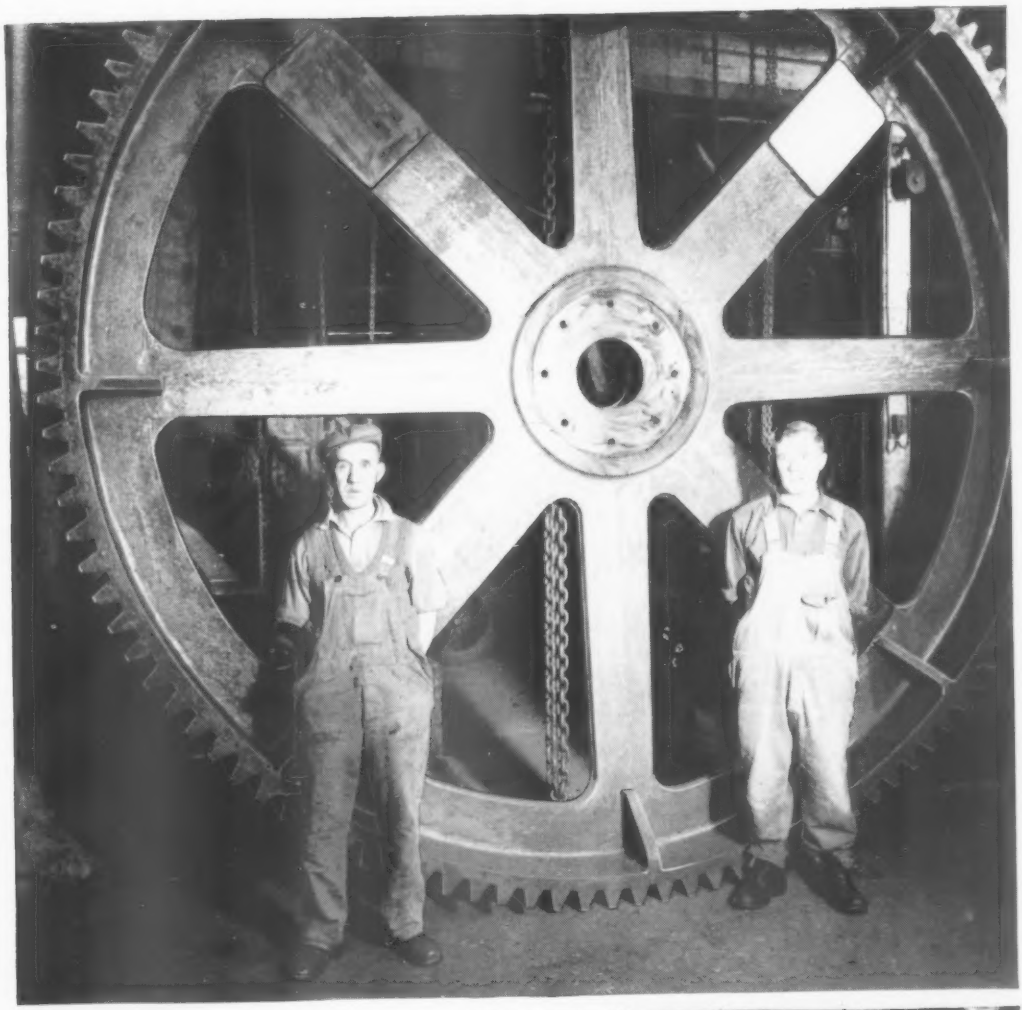
Foseco

fired dressings with **SHELL I.P.S.**

Sole distributors of I.P.S. 1 and I.P.S. 2 to the Foundry Industry in the United Kingdom and Republic of Ireland for Shell Chemical Company Limited.





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Quick and Easy Breakdown
Excellent Skin Finish

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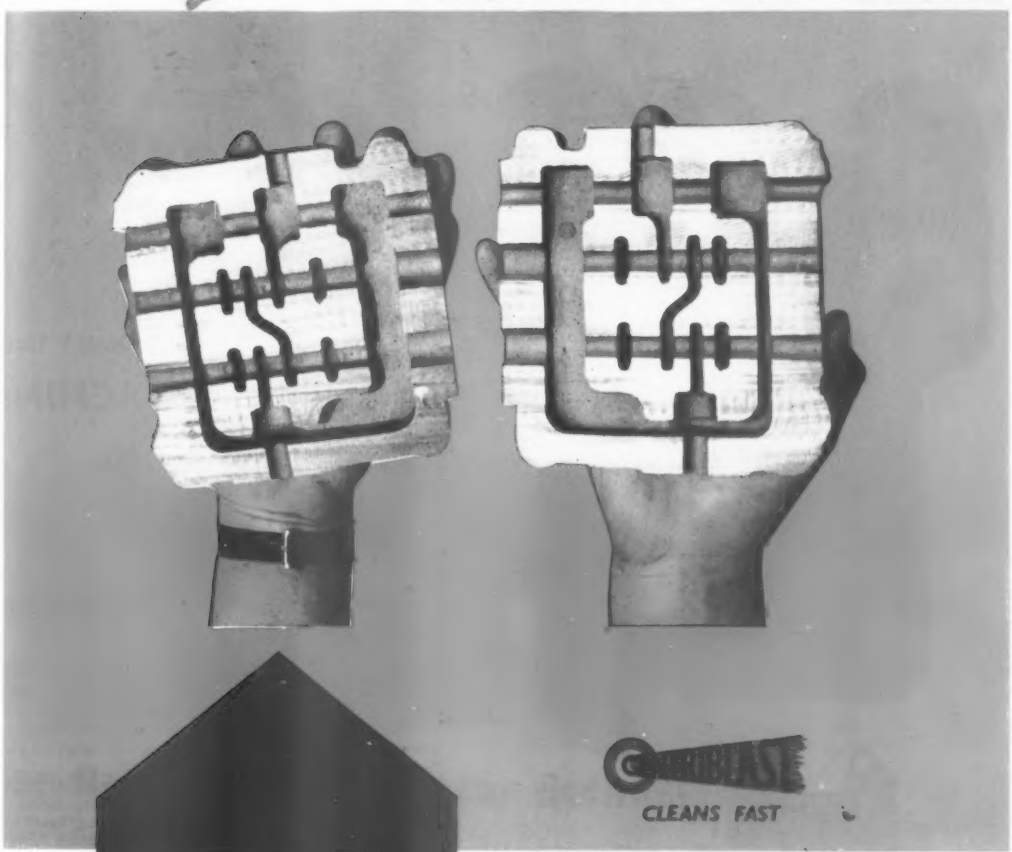

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The problem: How to clean the internal passages in this intricate casting.

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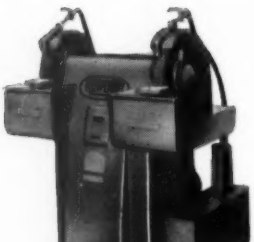

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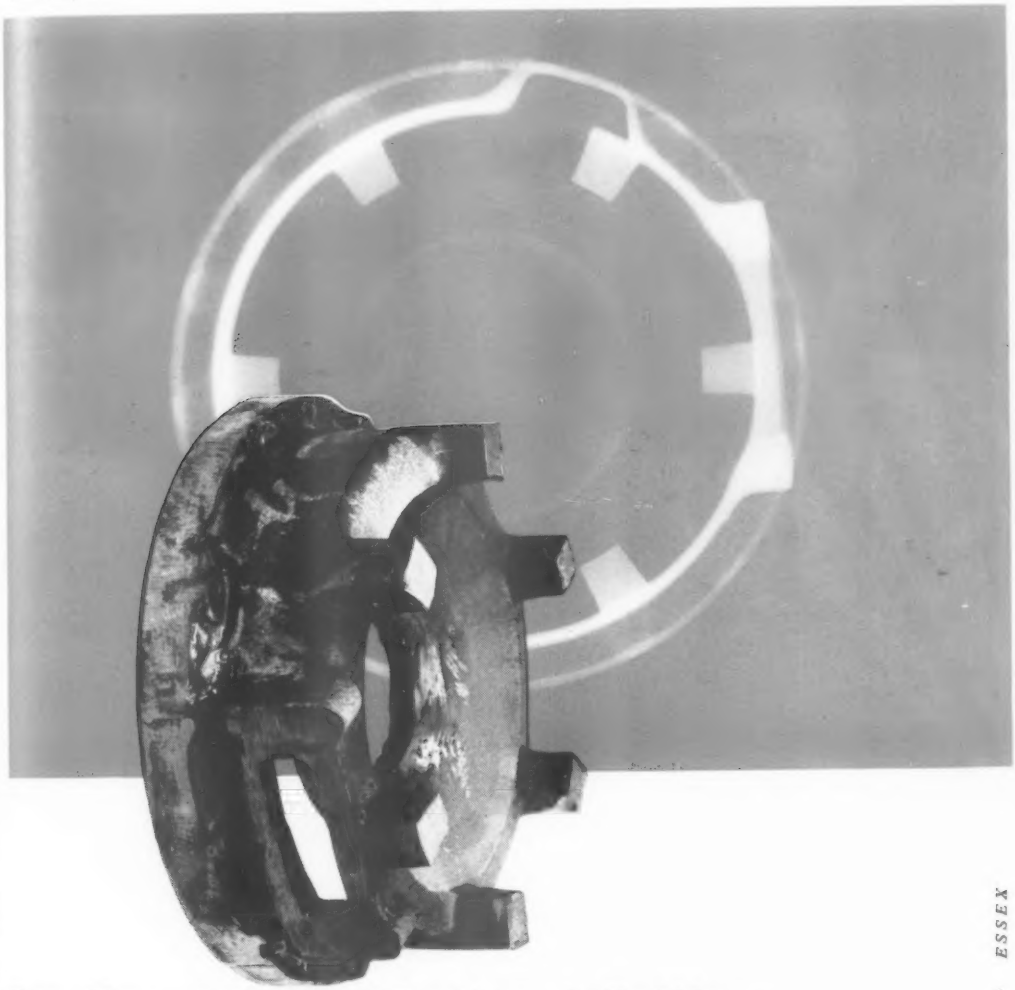

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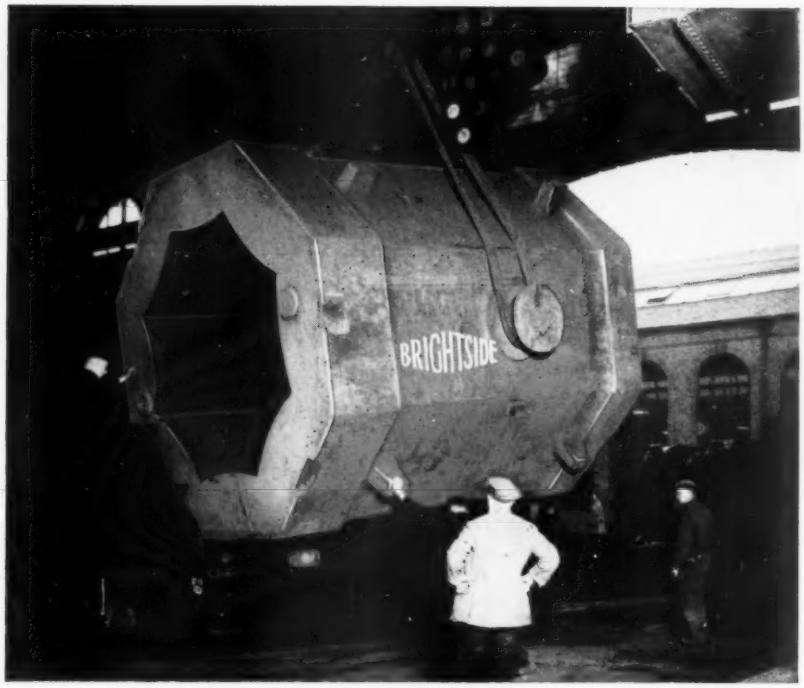

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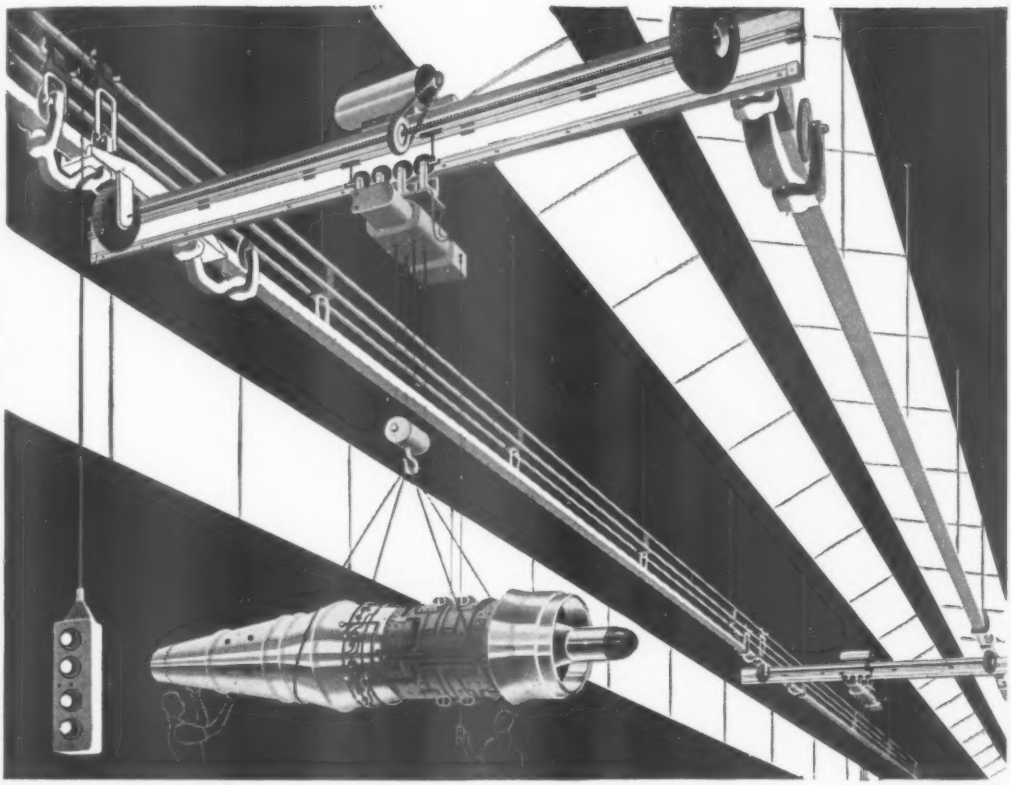

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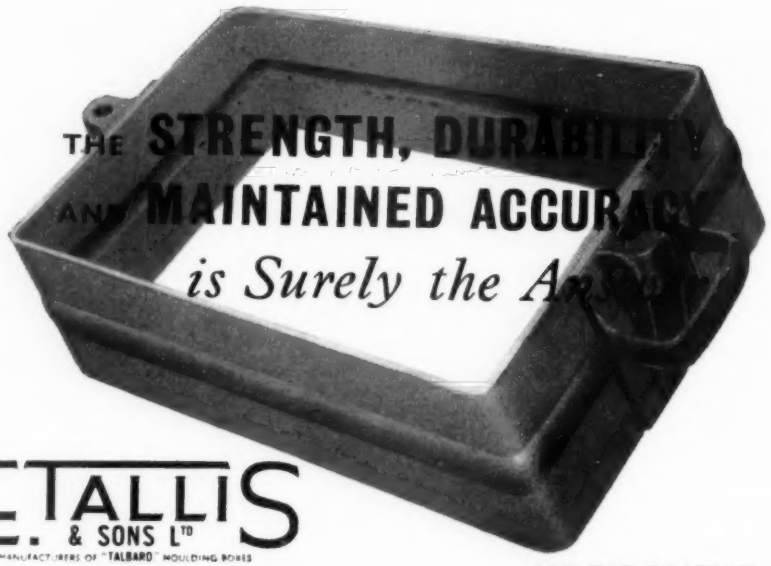

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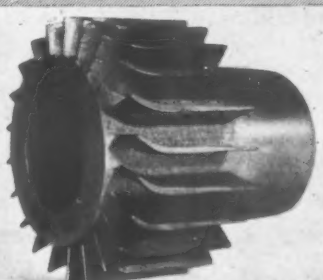

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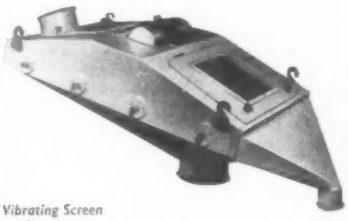

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Vibrating Crane Beam

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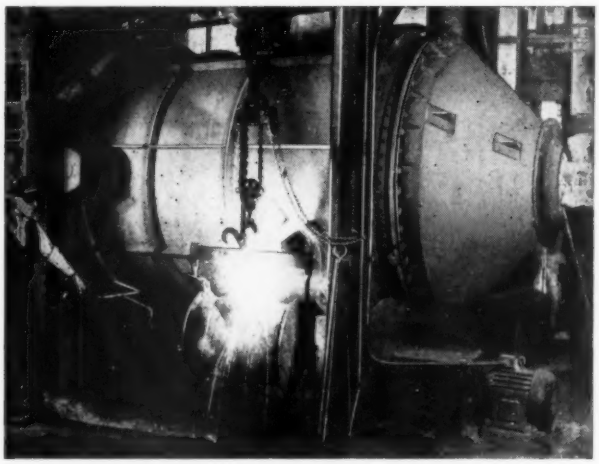

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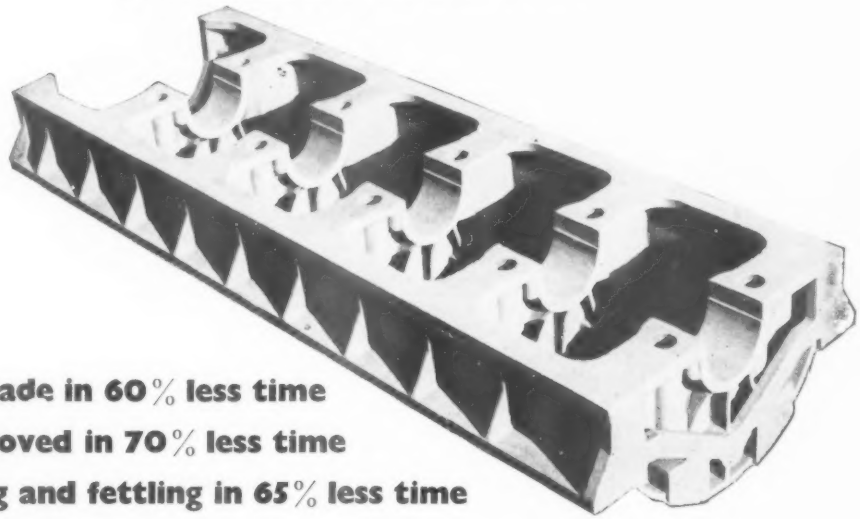

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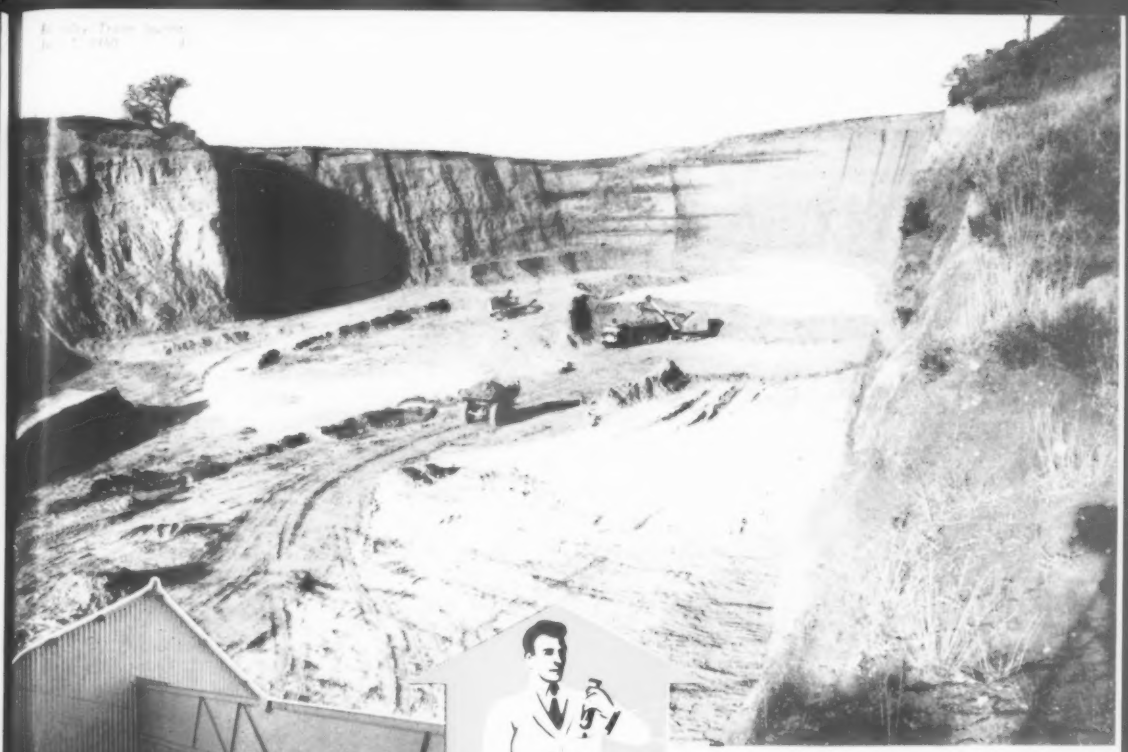

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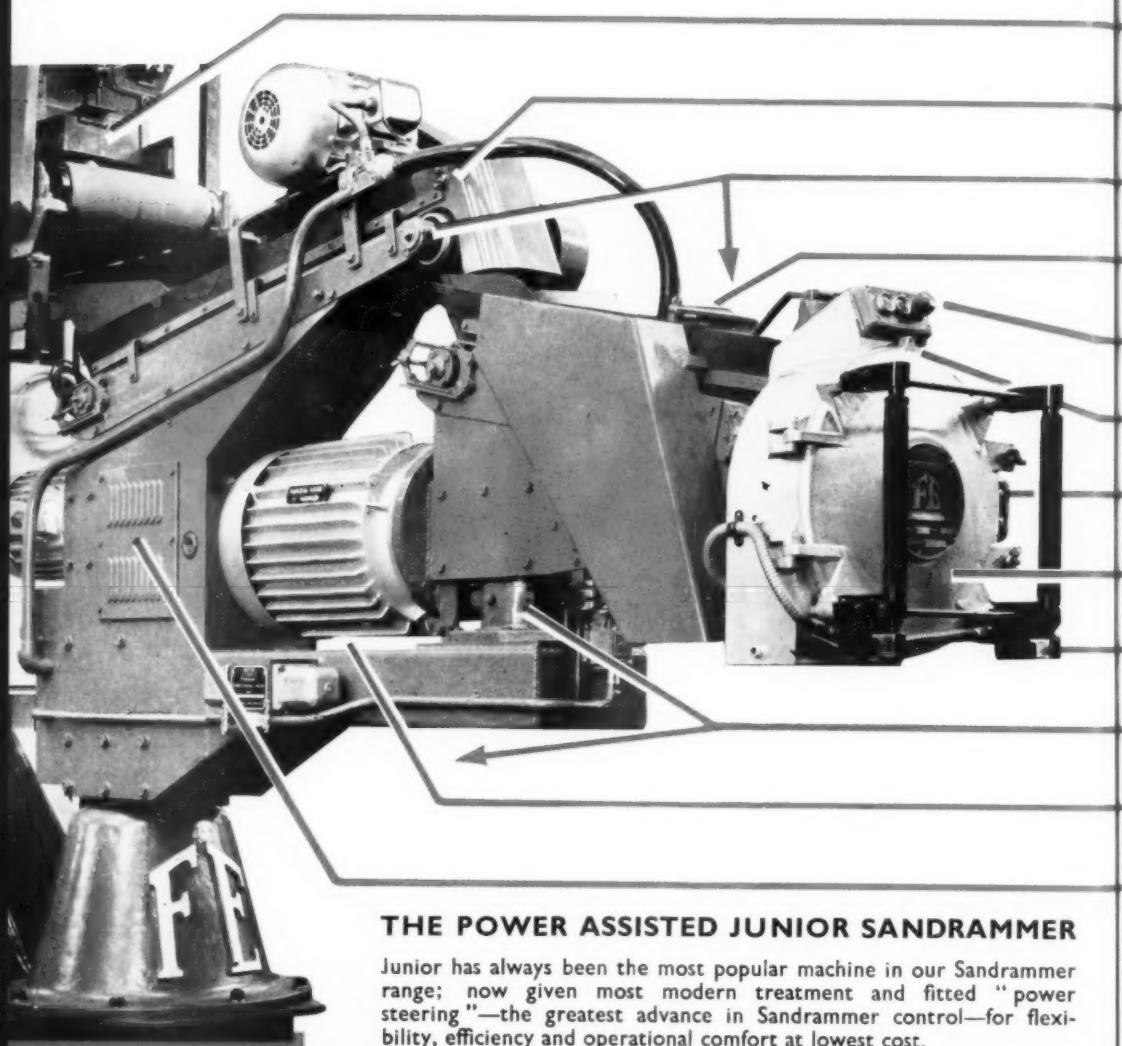

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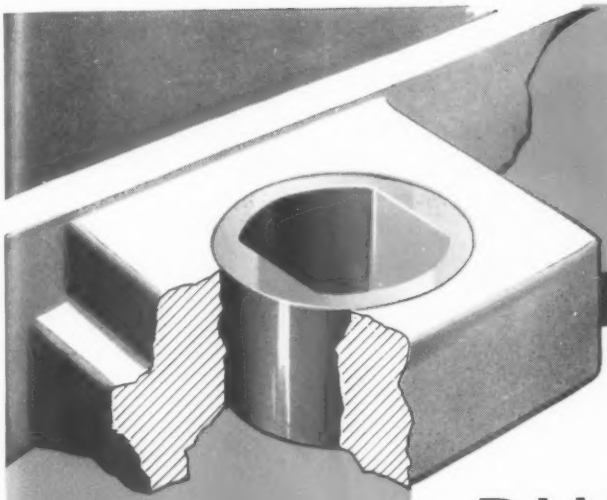

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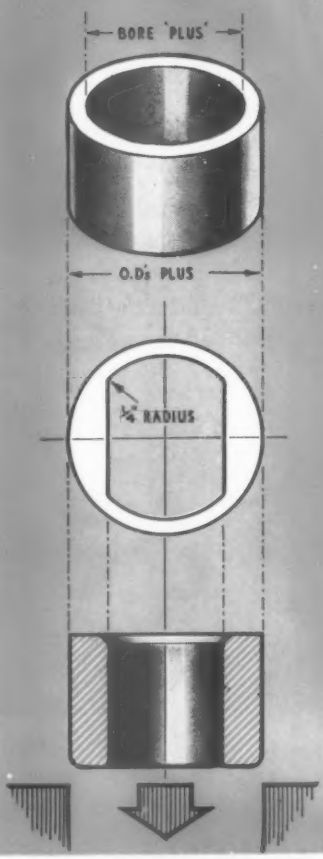

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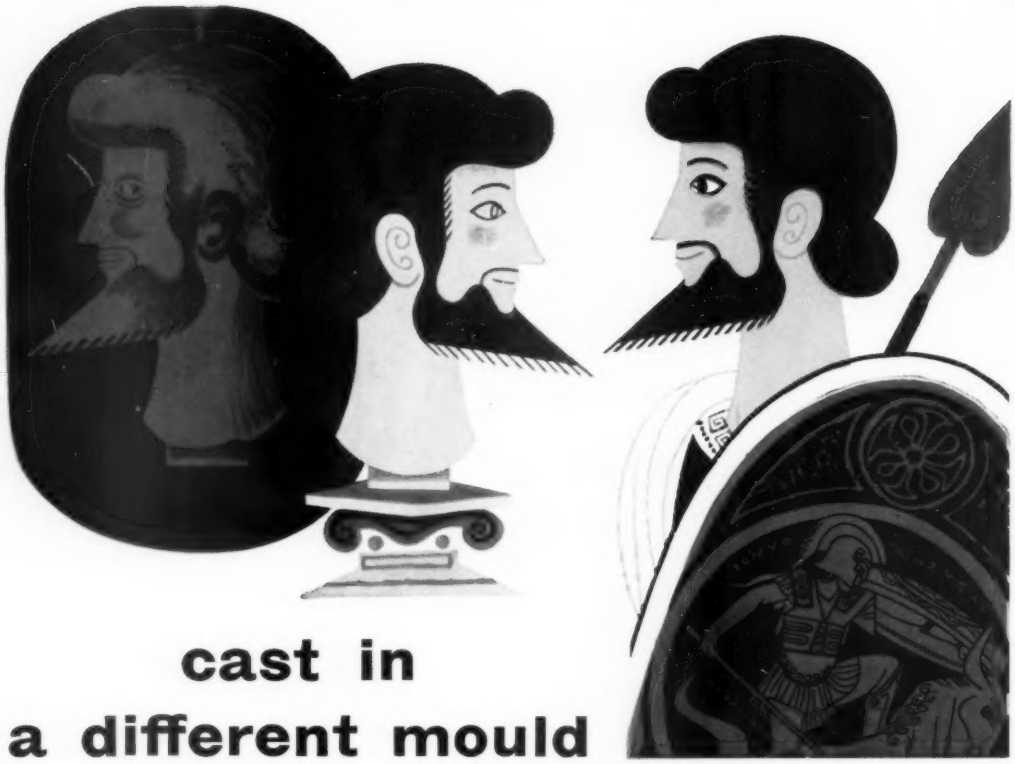

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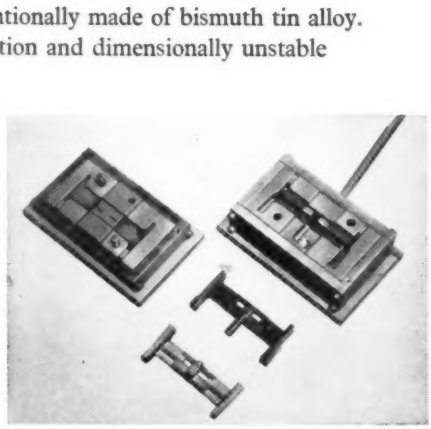

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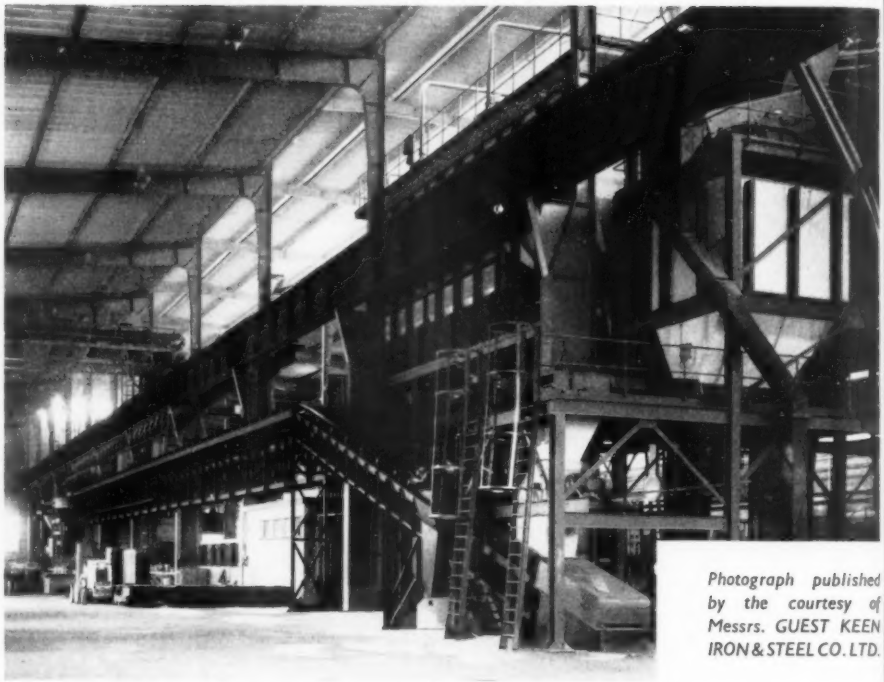

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J.J.M.

FOUNDRY
TRADE JOURNAL

Vol. 109 July 7, 1960 No. 2274

Plus ça Change . . . . . .

This week, there is a change in the editorial direction of the FOUNDRY TRADE JOURNAL. Mr. A. R. Parkes becomes editor and Mr. V. C. Faulkner assumes the position of editorial director. This alone assures the continuance of long-established policy of according the fullest measure of support to all the various associations within the foundry industry. Service to readers and advertisers has always been of high quality and one which we are well aware is highly appreciated. Perhaps it may be excusable on this occasion if we digress to record something of the JOURNAL's history and to "blow our own trumpet" a little.

The JOURNAL was established as a monthly in 1902. It was converted into a weekly paper in January, 1921. Since it was founded, it has had four editors whose names are known, commencing with Mr. Alexander Hayes who was appointed in 1908. He was followed by Dr. J. E. Hurst in 1919, until Mr. Faulkner's appointment towards the end of 1920. The JOURNAL has a world-wide circulation, in fact, of its direct subscription circulation, 45 per cent. goes overseas and it now reaches every important foundry in the world. (To-day, Japan heads the list of overseas subscribers, with the USA second.) Each day, the editorial department answers about a dozen commercial and technical queries, whilst the staff each year attend about 150 foundry functions, in addition to serving on at least 30 committees of various types. It is thus obvious that the JOURNAL is in a unique position faithfully to mirror the progress and developments in foundrywork taking place throughout the world. It is the only weekly journal serving the foundry industry and aims to give information of a practical character to its readers. In addition to foundry technology, the JOURNAL continuously records personnel movements within the industry and a hundred-and-one news items, knowledge of which keeps readers intimate with day-to-day events in the foundry world. Commercial and market news, too, enables quick appraisal of trading conditions and trends. The JOURNAL is forthright in its editorials and many of the policies therein advocated have been adopted by the industry. For years it carried propaganda for the establishment of research organizations, for the expansion of trade associations and their creation where gaps were obvious, and for international technical and industrial co-operation. (We doubt if in 1902, there was a single foundry association—excluding the trade unions—in the country, now there are about 70 of a trade and technical character.)

Mr. Faulkner, after nearly forty years occupancy of the editorial chair, has every intention of continuing his present activities so long as health permits, and the various trade societies and educational organizations can count on his close and enthusiastic co-operation.

V. C. FAULKNER, F.R.S.A.

Editor of the FOUNDRY TRADE JOURNAL from 1920 to 1960

Featuring . . . .

V. C. Faulkner :

MR. V. C. FAULKNER, who has now relinquished the Editorial Chair of the FOUNDRY TRADE JOURNAL after nearly 40 years, was born and educated in Sheffield. His association with the foundry industry before his appointment as Editor was somewhat sketchy. Certainly, for a short period, he managed a steel foundry at Chelmsford and made considerable quantities of electric-arc-melted metal for steel castings in various foundries on the Continent of Europe. After his appointment with the JOURNAL, he threw himself wholeheartedly into the organization of the foundry industry, for, in 1921, there was but the Light Castings Association (now the British Ironfounders' Association and the National Ironfoundry Employers' Federation) and—on the technical side—the Institute of British Foundrymen. His progress with the last-named organization was rapid, and by 1926, he was elected president. Later, he was an Oliver Stubbs Medallist and finally, was made an honorary member. In 1926, also, he called a meeting which resulted in the formation of the Foundry Trades Equipment & Supplies Association. Behind the scenes, he had much to do with the establishment of the Council of Ironfoundry Associations and the British Bronze and Brass Founders' Association. In the following year, Mr. Faulkner took a prominent part in the formation of the International Committee of Foundry Technical Associations. Since then he has participated in nearly all the international meetings and was president of the Committee in 1948.

Mr. Faulkner is a Liveryman of the Worshipful Company of Founders and a Freeman of the City of London, in addition to being an honorary member of the Czechoslovakian, French and German foundry technical associations.

Until recently, Mr. Faulkner's main outside distractions were long rambles and stamp collecting, but the former have been curtailed somewhat. He is considered by many foundrymen to be a connoisseur of wines and food.

* * * * *

A. R. Parkes :

MR. A. R. PARKES, the new Editor, is no newcomer to the scene, having been on the JOURNAL staff as assistant editor for the past thirteen years. Before that, he was actively associated with foundrywork, mainly on the metallurgical side. He received his early training at the County Technical College, Wednesbury, and the Birmingham Central Technical College.

His first job as the, then, sole employee of a new company set up to make piston-ring and cylinder-liner castings, was to instal a control laboratory, starting from scratch. After that, he spent 12 years in various foundries in this country (producing steel, grey and high-duty iron and some non-ferrous castings) followed by a period as chief metallurgist to a large group of foundries in India. He joined the Institute of British Foundrymen in 1936, presenting several papers before its branches before becoming secretary to the London branch in 1955; he is now senior vice-president of the London branch. His practical interest in youth training was exemplified first as technical college instructor and later by his organization of a highly-successful London apprentice competition.

Last year, Mr. Parkes presented a paper to the Foundry Section of the Hungarian Metallurgy and Mining Society on the structure of the U.K. foundry industry and this has been widely acclaimed as the most authoritative account ever published. He has participated in international foundry congresses in Scandinavia, Germany and Belgium, when he made a host of friends on the Continent of Europe. Mr. Parkes likes all forms of travelling, but prefers cars to trains for even quite long trips; for recreation, he chooses walking among hills.

National Foundry Craft Training Centre Appeal

The appeal for donations to meet the cost of rebuilding the National Foundry Craft Training Centre at West Bromwich, launched by the trustees of the College in May, has so far met with a very encouraging response. As reported in the JOURNAL (May 26 issue), the purpose behind the appeal is to provide training facilities likely to attract to the foundry industry boys of good calibre, and also a centre is needed capable of training double the number of boys which the College can at present accept.

Of the £100,000 required for rebuilding, £7,522 5s. has already been received; details of individual subscriptions up to June 28 are given below:—

	£	s.	d.
Ferranti, Limited	100	0	0
Newton Chambers & Co., Ltd.	100	0	0
W. Shaw & Co., Ltd.	250	0	0
William Mills, Limited	26	5	0
Aeroplane & Motor Aluminium Castings, Limited	250	0	0
Vickers, Limited	250	0	0
Westinghouse Brake & Signal Co., Ltd.	100	0	0
G.K.N. Group Services Limited	1,000	0	0
John Dale, Limited	10	10	0
Broom & Wade, Limited	150	0	0
Samuel Birkett & Sons (Cleckheaton), Limited	10	0	0
Clay Cross (Iron & Foundries), Limited	225	0	0
R. W. Collin, Limited	25	0	0
E. V. Deeley & Co. Ltd.	5	5	0
Ferrous Light Castings (1959), Limited	26	5	0
Thos. Jones & Sons (Farnworth), Limited	15	0	0
Jones & Attwood, Limited	5	0	0
Ley's Malleable Castings Co., Ltd.	350	0	0
Northampton Foundry Co., Ltd.	25	0	0
C. A. Parsons & Co., Ltd.	50	0	0
Newey Aluminium Foundry, Limited	5	0	0
Silley, Cox & Co., Ltd.	25	0	0
Smith & Wellstood, Limited	50	0	0
Baker Perkins, Limited	25	0	0
F. H. Lloyd & Co., Ltd.	50	0	0
Consett Iron Co., Ltd.	50	0	0
Sir W. H. Bailey & Co., Ltd.	65	0	0
Heyes & Co., Ltd.	5	0	0
Lomax & Smith, Limited	10	0	0
Kent Alloys, Limited	100	0	0
George Oxley & Sons, Limited	21	0	0
Metal Box Co., Ltd.	40	0	0
Wm. Beardmore & Co., Ltd.	300	0	0
Turton Bros. & Matthews, Limited	20	0	0
Birmid Industries, Limited	2,000	0	0
Hopyard Foundries, Limited	78	15	0
Harland Engineering Co., Ltd.	15	0	0
T. H. & J. Daniels, Limited	30	0	0
Gilbert Gilkes & Gordon, Limited	15	0	0
Shotton Bros, Limited	200	0	0
Langley Alloys, Limited	25	0	0
J. & E. Hall, Limited	75	0	0
Coventry Malleable & Aluminium, Limited	10	10	0
Staveley Coal & Iron Co., Ltd. (Group foundries)	500	0	0
Foundry & Engineering Co. (West Bromwich), Ltd.	20	0	0
High Duty Alloys, Limited	52	10	0
Cooper Roller Bearings Co., Ltd.	50	0	0
Enfield Foundry Co., Ltd.	26	5	0
Follsain-Wycliffe Foundries, Limited	100	0	0
Victor Castings, Limited	15	0	0
Royles, Limited	25	0	0
Worthington-Simpson, Limited	100	0	0
Walter Rowley, Limited	50	0	0
S. Russell & Sons, Limited	200	0	0
British Siddeley Engines, Limited	100	0	0
Alfred Ellison, Limited	50	0	0
Richards Foundries, Limited	25	0	0
Turton Bros. & Matthews, Limited	20	0	0

In addition to the above, promises have been received from a number of firms for contributions at the rate of £1 per foundry employee. The Foundry Trades' Equipment & Supplies Association is also known to be considering a substantial contribution.

Forty Years Ago

In the July, 1920 issue of the JOURNAL, the Editorial was devoted to the steps which were then being taken to form a "Research Association for the Grey and Malleable Cast Iron Trades." The formation was to be in the hands of Mr. T. Vickers who, on the inauguration of the Association, became its first president. The Editor wrote: "Possibly no industry in this country will benefit more from research work than the ironfounding trade. In the past it has occupied anything but a creditable position among the manufacturing industries of the country; very little progress has been made from a scientific point of view, archaic constructions and antiquated methods are tolerated complacently by employers, and in consequence there is a tremendous amount of leeway to be made good before the foundry can be raised to its proper position amongst the leading industries of the country, which its importance warrants."

There is also in this issue a full-scale description of the Springfield Steel Foundry of Glasgow, which had recently been modernized. This from to-day's standpoint can scarcely be credited, but 40 years ago, the foundry had splendid handling facilities from a multiplicity of overhead cranes. A description of a cupolette appeared for the first time in this issue of the JOURNAL. Amongst new companies listed appeared the names of Arbroath Foundry Company, Limited; Triplex Foundry, Limited; Robert Jenkins & Company, Limited, and William Asquith (1920), Limited.

British Exhibition in New York

Reviewing the recent British Exhibition in New York, Lord Rootes, chairman of the Dollar Exports Councils, says the exhibition was an outstanding success. More than 30,000 buyers registered their names and over 10,000 made inquiries at the joint Dollar Exports Council and Federation of British Industries' stand alone.

In regard to industrial development in Britain, more than 100 inquiries for factory development were received. The firm of Anderston Clyde Engineers, Limited, makers of mobile hydraulic uplift ladders, of Glasgow, had received orders worth more than £400,000.

Success of the exhibition meant that Britain could improve her export trade to the dollar area, said Lord Rootes, who added that recent figures for trading between Britain and the US were "frightening." Exports from the UK to the US increased by 7.4 per cent. during June and those to Canada rose by 14.4 per cent., but America increased her exports to this country by 95.6 per cent. and Canada by 40 per cent.

IBF Fifty-seventh Annual Conference

General Account of Proceedings at Malvern, June 21 to June 24.

The choice of Malvern, the well-known Worcestershire spa, as the venue for the Institute of British Foundrymen's 57th annual conference was vindicated by events, all the functions being carried on successfully. The town proved sufficiently close to the many foundries in the Black Country and Coventry areas which were offering hospitality for the works visits, the Winter Gardens offered a large-enough banqueting and dancing hall, plus adequate meeting-room accommodation, and the hotels, though on the whole both small and scattered, did their best to cater for the varied requirements of the large numbers attending. In the following pages, the early proceedings of the conference, the annual meeting and the Edward Williams lecture are described in some detail and a future account will cover the presidential address, some of the technical sessions and the concluding function.

"The Malvern Conference was a good one." This will undoubtedly be the verdict of all who attended and will long be repeated by conference delegates as they indulge in reminiscences at future gatherings of the Institute of British Foundrymen. Particular praise for this fact is due to the Birmingham branch as organizers, to Mr. M. M. Hallett, the indefatigable and painstaking conference secretary, who supervised every detail of the arrangements—and drilled his veritable army of stewards into a disciplined body—and not least to the IBF head office secretariat.

Programme Summary

The conference was centred on the Winter Gardens, Malvern, and as briefly announced in last week's issue of this JOURNAL, the proceedings (as far as the general membership of the Institute was concerned) commenced with a half-day of works visits on the Tuesday. This was followed on that evening by a civic reception. The annual general meeting, presidential address and the Edward Williams lecture occupied Wednesday morning, the afternoon being devoted to technical sessions and that evening to the holding of the Institute's annual banquet. All day Thursday was taken up by works visits, with the evening free or occupied by a visit to the theatre. Technical sessions were resumed on the Friday and the informal dinner and dance in the evening closed the proceedings. In general, everything went off well, though there were some near mishaps due to flooding of some of the works to be visited and there were a few minor grumbles about the hotel accommodation—for neither of which none of the organizers could be blamed, of course! Bearing in mind the scattered nature of the accommodation provided for delegates at Malvern, it really does say much for the painstaking organization that clockwork precision was maintained for all the functions. As usual, a separate programme was arranged for the ladies except on occasions where they joined with their menfolk for various joint functions.

First-day's Events

A number of conference delegates assembled in Malvern on the Monday of conference week for Council and committee meetings, which were held in the Abbey Hotel. The main assembly of delegates, however, did not take place until lunchtime on Tuesday and this was at the Station Hotel, Dudley. This rendezvous preceded an afternoon of works visits for the men, and the same period of sightseeing for the ladies. Groups of members travelled to the works nearby of Arthur Shaw & Company, Limited; Beans Industries, Limited; Duport Foundries, Limited; Northern Aluminium Company, Limited, and Bilston Foundries, Limited. On one of these visits—to Arthur Shaw & Company—an innovation was the inclusion of ladies in the party and, by all accounts, this was much appreciated. The other ladies of the main party either paid visits to Dudley Zoo or to one of two glassworks at Stourbridge—Webb Corbett, Limited, and Thos. Webb & Sons—which offered hospitality.

All the parties reassembled for tea at the Station Hotel, Dudley, and then joined coaches for Malvern, dropping off at their respective hotels. In the evening, there was a reception for members and ladies in the main hall of the Winter Gardens, by Malvern Urban District Council. It lasted from 8.30 p.m. to midnight, the formal part of the proceedings being followed by dancing and the serving of light refreshments. Presiding at this function was Councillor H. F. Lewis, J.P., chairman of UDC, supported by Mrs. Lewis and other civic dignitaries. The foundrymen were headed by Mr. Charles H. Wilson (who, of course, remained in office as president of the Institute until the annual general meeting held the following day). The function proved a very pleasant informal affair, much appreciated by those attending.

ANNUAL GENERAL MEETING

The annual general meeting of the Institute commenced promptly at 9.15 a.m. in the theatre auditorium of the Winter Gardens, Malvern, on the

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Photographs on the facing page were taken during the annual meeting of the Institute on the Wednesday: (a) The new president, Mr. G. R. Shotton, being invested with the chain of office (Mr. D. A. Richards, senior vice-president, is on left); (b) Mr. F. B. Hooper (on behalf of FOUNDRY TRADE JOURNAL) *handing over the British Foundry Medal and Prize to Mr. John Bell, representing Mr. G. D. McNair; (c) Mr. Wilson congratulating Mr. G. R. Webster on his election as junior vice-president; (d) presentation of the John Bell Travelling Scholarship to Mr. R. L. P. Salmond; (e) award of a certificate of honorary membership by Mr. Wilson to Mr. Arthur Phillips; (f) Mr. J. Taylor receiving a diploma of the Institute for his paper on "Steel Castings for High-pressure Turbine Components" (joint author with Mr. G. L. Hancock); (g) Mr. A. D. Morgan getting a diploma for the paper on the "Influence of Manganese-sulphide Segregation in Vitreous Enamelling" (joint author with Mr. C. C. Hanson) and (h) presentation of the Meritorious Services Medal to Mr. Frank Shepherd (left) by Mr. C. H. Wilson.*

Wednesday morning of conference week. At the presidential table "across the footlights" from the members were the president, Mr. C. H. Wilson, the president-elect, Mr. G. R. Shotton, the (then) junior vice-president, Mr. D. A. Richards, Mr. N. P. Newman, C.B.E., J.P., hon. treasurer, and Mr. George Lambert, the secretary. Early in the proceedings, the president officially welcomed overseas visitors to the conference, namely, Mr. G. P. Adams (president of the Australian (Victoria) branch of the Institute); Mr. John Steele (secretary of the South African branch); Mr. Harold Stevens (who had come from Australia to give one of the papers); Mr. C. F. Joseph (presenting the paper sponsored by the American Foundrymen's Society), and three from India, Mr. C. H. Gibbs, Mr. M. K. Rao, and Mr. M. N. Srinivasan.

After the formal business of "apologies" and "minutes," Mr. Wilson next presented for adoption the report of the Institute's Council which had previously been circulated. He stressed only the report's principal points. Noteworthy events during the year, he said, were the changes in the bye-laws which it was hoped would result in increased status for members; the move of the head office to London —for which smooth transfer he thanked the secretary, Mr. G. Lambert and his staff—and the Foremen's Course which during the year had again been promulgated successfully at Harrogate.

Accounts were next presented by Mr. N. P. Newman, these had also been previously published and showed a surplus over the year of £1,450 in spite of the heavy—and non-recurring—expense occasioned by the move of the head office to London. Mr. J. Blakiston (past-president) formally seconded the adoption of the accounts and they were accepted without dissenters.

Technical Council's Report

In rather more detail, Mr. M. M. Hallett, chairman of the IBF Technical Council, presented the report of that body. First, he briefly outlined the composition of the Council and its quite complicated committee structure, making the point that a total of 180 or more IBF members and co-opted research workers were actively concerned in advancing the technical aims of the Institute. When it was borne in mind that each one of these also received help from his employers and colleagues at the various works, Mr. Hallett said it made a remarkable harnessing of effort on behalf of the Institute. Next, the chairman briefly read out the list of committees who were reporting their findings at the present conference and mentioned the names and objectives of new sub-committees which had been formed.

Dr. D. V. Atterton, vice-chairman, seconded the report of the Technical Council—which made the 28th to be presented—and stressed that what had made possible this immense programme was in fact the backing of members' companies (meaning time, money and facilities), the research associations, the universities, other institutes and the foundry industry's trade associations, with last but not least, much help from the Joint Iron Council.

Presentation of Awards

Mr. C. H. Wilson then proceeded to the distribution of the year's crop of Institute Awards for meritorious services and recognition of outstanding technical contributions, as follows:—

Honorary Membership

First amongst the awards was the presentation of a certificate of honorary membership of the Institute to Mr. Arthur Phillips, now retired, but until recently foundry manager at Metropolitan-Vickers Electrical Company, Limited, Manchester, and a member of the Institute since 1922. Acknowledging the award, Mr. Phillips said that he really regarded it as a tribute to the Lancashire branch and that he was especially pleased to receive it in association with a Birmingham branch conference, for it was at an earlier conference organized by that branch where he was first received into the Institute.

E. J. Fox Medal

On the recommendation of the assessors (Sir Frederick Scopes and Mr. H. J. V. Williams) the Council awarded the E. J. Fox Medal for 1960 to Dr. H. T. Angus, M.SC., in recognition of his work in development and liaison between the Institute and industry and in applied foundry research. In receiving this medal, Dr. Angus made suitable acknowledgment, referring to the help he had always received from his colleagues at the British Cast Iron Research Association.

Oliver Stubbs Medal

Mr. A. Tipper, M.SC., F.I.M., was presented with the Oliver Stubbs Gold Medal of the Institute in recognition of his pioneer work in the development of moulding sands and corebinders, and services to

the Technical Council of the Institute for 27 years.

Meritorious Services Medal

The Council had endorsed the decision of the Executive Committee to award the Meritorious Services Medal to Mr. Frank Shepherd. This was next presented to Mr. Shepherd in person, in recognition of his services as secretary of the Tees-side branch for 13 years, for work in the field of education and particularly in the running of IBF apprentice competitions.

British Foundry Medal and Prize

At this juncture, Mr. Wilson called on Mr. F. B. Hooper (deputizing for Mr. Barrington Hooper, C.B.E., who was indisposed) to present the British Foundry Medal and Prize (donated by the FOUNDRY TRADE JOURNAL) for the best paper given during the year. This contribution to the IBF annual proceedings had been adjudged as the paper entitled, "Increasing Efficiency in the Steel Foundry," by Mr. G. D. McNair, and the award was received on the Author's behalf by Mr. J. Bell. Mr. McNair is a member of the Scottish branch of the Institute and works manager of the Fullwood Foundry Company, Limited.

John Bell Travelling Scholarship

This award was made to Mr. R. L. P. Salmond for excellence in studies at the Royal College of Science and Technology, Glasgow, and Mr. Salmond made suitable acknowledgment, indicating that he would use it to broaden his experience by visiting foundries on the Continent.

Diplomas

Concluding the awards, the president handed over diplomas of the Institute for high-quality technical contributions over the year as follows:—To Mr. A. P. Riley and Mr. T. Hurst for their paper "Running an Apprentice Competition," presented at the Scarborough Conference; to Mr. G. L. Hancock and Mr. J. Taylor for their paper "Some Experiences in the Manufacture of Steel Castings for High-pressure Turbine Components," presented at the Scarborough Conference, and to Mr. C. C. Hanson and Mr. A. D. Morgan for their paper "Influence of Manganese-sulphide Segregation on Vitreous Enamelling of Grey Cast Iron," presented to the Scottish branch. Unfortunately, Mr. Riley and Mr. Hanson were unable to be present to receive their diplomas, but these were accepted by their co-authors on their behalf.

Election of Officers

Continuing with the business of the annual general meeting, the next item was the election of officers for the 1960/61 session as follows:

President. Making the formal proposition that Mr. G. R. Shotton, F.I.M. (managing director, Shotton Bros., Limited, Oldbury) be elected as president, Mr. Wilson referred to the burden which had already been placed upon Mr. Shotton during the year past as his own deputy when he had been absent abroad. Experience had shown, he said, that Mr. Shotton was eminently suited for the office. In acknowledging his election, after the proposition had been seconded by Mr. S. H. Russell, and he had been invested with the presidential badge, Mr. Shotton said he felt humble rather than proud and very conscious of the dignity and responsibility of office.

Senior Vice-president. Recommending the elevation of Mr. D. A. Richards from junior to senior vice-president, Mr. N. P. Newman described him as quiet, loyal, hardworking and conscientious and

Left-hand section of the assembly of IBF delegates and ladies in the Winter Gardens, Malvern, for the annual banquet.

said he had been a tower of strength when twice president of the Bristol and West of England branch. Before its endorsement by the meeting, this proposition was supported by Mr. J. Blakiston, M.I.MECH.E., past-president, and Mr. Richards, in turn, was invested with the senior vice-president's badge, and thanked the meeting for their confidence.

Junior Vice-president. Representing the London branch of the Institute, where the annual conference will be held in 1962, Mr. G. R. Webster, A.M.I.MECH.E. F.I.M. was proposed by Mr. R. B. Templeton for this office and was seconded by Mr. F. A. Wilson, and the proposal was accepted with acclamation. Mr. Webster made brief acknowledgement of the honour and joined the rest of the officers on the platform.

Auditors. J. & A. W. Sully & Company were re-appointed auditors for the year.

Elected Members of Council. Each year, a number of members of General Council of the Institute who have been elected on a national basis by the general membership retire and a ballot is held to choose their successors. The results of this ballot were then announced in the meeting as (in alphabetical order): Dr. D. V. Atterton (Foundry Services, Limited), Mr. H. G. Hall (Castings, Limited), Mr. Jack Hill (Ley's Malleable Castings Company, Limited), Mr. P. S. Russell (S. Russell & Sons, Limited), and Mr. F. Arnold Wilson.

To conclude the business of the annual general meeting, a vote of thanks to the retiring president was proposed by Mr. G. R. Shotton who referred, during his congratulatory remarks, to Mr. Wilson's heavy list of duties well carried out during the year and particularly to his work as the Institute's ambassador on trips abroad. Mr. A. E. Peace seconded and the motion was carried with applause.

PRESIDENTIAL ADDRESS

After an interval for coffee, members reassembled in the same auditorium to hear the presidential address by the new president, Mr. G. R. Shotton, Mr. C. H. Wilson remaining in the chair. To choose a subject for an address on election to the premier office in the Institute must pose one of the most difficult problems a vice-president has to face during his two-years initiation period "training" for the position. For Mr. Shotton, however, the problem was in the end simplified—he decided to talk about a phase of foundrywork to which he had dedicated much of his lifework, namely, "The Status and Training of Future Foundrymen."

[*Extracts from Mr. Shotton's Address will be printed shortly.*]

"RESEARCH AND INDUSTRY"

This subject was chosen by Mr. H. Morrogh (director, British Cast Iron Research Association) as the theme for the annual Edward Williams Memorial Lecture which he was invited to deliver after the Presidential Address, during the annual meeting.

Initially, Mr. Morrogh said his subject was appropriate because one of the more-important of the objects of the Institute was to initiate and conduct researches into the science and technology of metal and alloy production. He went on to to say that:

"A progressive industry wishing to maintain and expand its business must be prepared to accommodate changes in its processes, products, raw materials and methods of working. One of the most important ways by which technical

Right-hand section of the gathering, photographed in the Winter Gardens, of IBF delegates and their ladies while they were attending the banquet.

Mr. Geoff Lamb (secretary, East Midlands branch) in pensive mood and Mr. J. F. Stanier (Sheffield branch) in a jovial one, at the IBF annual banquet.

improvements arise is by the application of the results of scientific research and development to industrial production. Research is essentially a management technique which cannot be ignored by management in other industrial fields.

Management Appreciation

"Management must be aware of the problems of the strategy and tactics of research, the peculiar problems of organizing it, of how much it costs, how best to apply its results and how best to influence its direction to suit industrial needs," Mr. Morrogh continued, adding that it was commonplace to suggest that whereas research was often pursued with brilliant results in this country, its conclusions were applied in industry less effectively and more slowly than in other countries. Careful examination of the facts suggested that this was by no means wholly true. "This does not mean," he continued, "that industry in this country is ahead of competitors in this respect, but merely that in this country we are not unique either in our ability to promote research or in utilizing its results. Any assessment of the relative speed and effectiveness of the application of new ideas and inventions between different countries, and between different firms in a given industry in this country, needs to be made with circumspection and over a considerable period. Frequently, new processes are very quickly adopted by relatively technically-backward companies, since their existing processes are so inefficient that any change is certain to be an improvement. On the other hand, the technically-competent firms will carefully note such new developments, subject them to keen appraisal and only then adopt them after considerable further development work."

Classes of Research

Mr. Morrogh then went on *inter alia* to say that in any discussion of the general principles of research and its application, it was necessary to recognize that there were different classes of research, motivated by different attitudes and for the purpose of his lecture, and in the narrow context of the industrial application of research, he used the definitions of "pure research" and "technological research." The lecturer then enlarged on these two aspects of research, saying that: "pure research is concerned with the establishment of basic scientific principles and with the acquisition of new knowledge, with no other object than to improve understanding of truth. Technological research may be 'fundamental' or 'applied' and is generally related to a specific aspect of industrial activity. It is usually conducted to provide more information on materials and processes, with the thought that its results will provide a better understanding and control, and also with a view to the solution of clearly-defined problems in specific fields." Mr. Morrogh said that there was, however, no clear line of distinction between the various types of research. Research which began as a pure seeking for knowledge could quickly develop results of obvious industrial significance. Pure research was particularly the province of the universities, although a few large companies claimed to support such activities.

It was doubtful, Mr. Morrogh said, whether any companies in the foundry industry were large enough to support work of this nature. Scientists engaged in pure research were interested in adding to human knowledge, whilst industry existed to make a profit.

Fundamental Technology

Fundamental technological research was alike the province of the academic worker and the responsibility of industry. The cast-metals industry had much need for fundamental technological research in many different fields, *e.g.*, there was still much to learn about the mechanisms involved in solidification of metals and the results obtained from the study of one alloy were likely to be pertinent to the industrial problems experienced with another. Such a better understanding could also lead to the development of new features of control, new casting alloys and improved properties which could not be anticipated beforehand. Mr. Morrogh said that he could quote many other cases of desirable fundamental work related to foundry technology but, in general, the principal requirement was that it should be conducted continuously on a long-term basis.

Applied Technology

Turning to applied technological research, Mr. Morrogh said this was an essential industrial requirement, but it was always characterized by having a definite objective—the solution of a problem in relation to a known process, or the development of a new process or material. When fundamental technological research produced a promising result, it often had to be followed by applied research. "A brief and highly-subjective

analysis of the various types of research and development activity," Mr. Morrogh continued, "presents a much tidier picture than actually occurs in practice, and it will be readily confessed by many research workers that their work did not proceed in the orderly manner often described in the final published account."

Future of Foundry Research

The lecturer next discussed the future rôle of foundry research and said that the success and value of researches carried out in the past to the foundry industry underlined the importance of increasing research effort in the fields of shell-moulding, the sodium-silicate/CO_2 Process and high-pressure moulding. The process of making the mould was at least as important as the melting process and the metallurgy of the product, both from the point of view of the economics of the founding operation and the value of the casting to the customer.

Next, Mr. Morrogh dealt with health hazards of various foundry operations, saying that the future of the industry depended in a large measure on its ability to eliminate or control the nuisances of fume and dust and the industry would certainly come under increasing pressure to do this.

The handling and treatment of casting alloys had reached a stage when the techniques and disciplines of the chemical engineer were required, and Mr. Morrogh said that the engineer expected the cast-metals industry to provide a rational basis for the design of castings and the calculation of working stresses in complex and large sections. While the engineer had some responsibility to help himself in these matters, the lecturer stressed that the future of the cast-metals industry demanded that the foundrymen should take the initiative in obtaining the data required.

Mr. Morrogh continued: "The castings industry, in common with many others, records a considerable volume of production control data and it is pertinent to enquire whether the industry makes full use of these data." Increasingly in the industry it was realized that the properties of metals and alloys might be influenced in the most profound manner by traces of impurities and Mr. Morrogh felt that much further work was required on the influence of trace elements.

Scale of Experiments

Discussing the matter of the scale of experiments, Mr. Morrogh said that large-scale experiments needed careful planning and complete understanding and co-operation must exist between research staff and production personnel. "Those directing such experiments must be careful to avoid creating the impression that the research worker is being brought in to prove that the production men have been doing their jobs wrongly or inefficiently in the past," he said. "Similarly, research workers must recognize when an experiment is being carried out under production conditions; the fact that managements charged with the immediate responsibility for production are prepared to submit their operations to scrutiny by experiment should be ample encouragement to the research worker. It is essential that those who have co-operated in works trials should not subsequently be subjected to recrimination if the results of the experiments reflect adversely on previous practices."

Mr. Morrogh then emphasized the need for research workers to be provided with facilities for conducting experiments on a large scale in the laboratory. Many of the universities and colleges were very poorly equipped for the melting and casting of metals and for mould-making on a reasonable scale, and in the future such research centres serving the foundry industry would continue to require, in addition to the services of chemical analysis, metallography, etc., facilities approaching the industrial scale or pilot-plant scale to an increasing extent for melting, casting and moulding investigations.

Research Staff

The next question was what could be done? This automatically involved consideration of cost, the availability of trained pesonnel and the provision of the required facilities. Dealing with personnel, Mr. Morrogh said: "Qualified people whilst possessing the basic training for research work are not necessarily simply by virtue of this competent to carry it out. Research requires an enquiring mind, preparedness to challenge accepted ideas, and an ability to conceive and carry out experimental work to test new ideas. In the context of industrial research, my limited experience suggests that it is highly important and necessary for a research worker to have intimate contact with industry and its problems. Similarly, industry should develop the habit of consulting the research worker, but it should not be discouraged if immediate solutions to its problems are not forthcoming.

"The research worker is often believed to have a predilection for theorizing, but I have often heard from research workers how impressed they are by the facility with which those concerned with industrial production theorize about the materials and processes which they handle. Similarly, industry will comment critically on the glib tendency of research workers to make impracticable and facile suggestions as to how production processes should be operated."

Staff Interchange

Mr. Morrogh then followed this by suggesting that selected men from industry could, with considerable advantage to themselves and their companies, be sent to work in laboratories of research institutes and *vice versa*, but for not less a period than six months.

Cost of Research

Mr. Morrogh next dealt with the cost of research in this country and said that the organization of research for a given industry depended on the

IBF Banquet Scenes:

(a) Mr. and Mrs. A. Tipper being received by the president and Mrs. Shotton; (b) Mr. G. R. Shotton proposing the "Loyal Toast"; (c) the Marquess of Exeter proposing the toast to "The Institute"; and (d) Professor F. W. Shotton, M.B.E., replying to the toast of "The Guests."

(e) Part of top table—(from l. to r.) Mr. G. C. Paterson (president, FTE & SA), Mr. W. Brindley (Dartmouth Auto Castings, Limited), Miss J. C. Brindley, Mr. C. F. Joseph, B.S. (General Motors Corporation, USA), Mrs. Dowle and Mr. R. V. Dowle (Birmingham Aluminium Casting (1903) Company, Limited); (f) Mr. L. E. Turner (Bonnington Castings, Limited), Mr. H. J. Bullock (British Moulding Machine Company, Limited), Mr. J. E. Allcock (Meriton Foundry, Limited), and Mr. F. A. Wilson (Baker Perkins, Limited); (g) Mr. G. R. Webster, A.M.I.MECH.E., the new junior vice-president of the Institute with Mrs. Webster.

size of the industry and the size of the units within the industry. Table 1 shows the estimated UK expenditure on research and development for various industries during 1958.

TABLE 1.—*Estimated Expenditure on Research and Development for Various Industries, 1958.**

	Expenditure, £ million.	Percentage of net output.†	Cost per qualified worker in research and development (£).
Ceramics	3.2	1.1	8,727
Chemicals	43.0	5.9	6,655
Iron and steel	5.1	0.9	6,103
Non-ferrous	3.0	2.1	8,489
Engineering and shipbuilding	29.4	1.8	8,472
Electrical engineering	64.5	9.8	7,472
Aircraft	100.0	35.7	30,763
Vehicles and components	17.1	3.3	19,778
Instruments	11.6	10.7	13,535
Textiles	8.6	0.9	8,191
Food, drink and tobacco	5.0	0.6	6,642
Wood, paper and printing	2.0	0.25	7,244
Others	4.1	1.8	5,313

* From "Industrial Research and Development Expenditure, 1958," D.S.I.R. Report published by H.M. Stationery Office.

† Defined as the value added to materials by production processes, and including gross margin on merchanted or factored goods.

Explaining this, Mr. Morrogh said: "The cost of capital equipment required to conduct some aspects of technological research pertinent to foundry operations, and the degree of scientific specialization required to perfect certain techniques of investigation, is such that few, if any, companies with foundries would be able to justify it as an individual private activity." This was the reason, Mr. Morrogh said, why the foundry industry depended largely on the results of researches sponsored by the suppliers of plant and materials, on the results of co-operative research and also on results of research supported on a co-operative basis at the research associations with substantial assistance from the Department of Scientific and Industrial Research.

The lecturer then mentioned the value in the field of research of foreign and patent literature, and said that a technically progressive company must take steps continuously to appraise foreign literature for contributions pertinent to its own operations. Research associations also served the industry in this respect by providing extensive abstracts of foreign literature which were available through the various library services.

Co-operative Research

"The valuable research contributions by the suppliers of materials and equipment, and even of users of castings, must not be overlooked," he added, "but it is clear that, taking the industry as a whole, co-operative research makes the biggest single research contribution of a continuous character." Much of the best research work arises from ideas of individual research workers and Mr. Morrogh said they should be given the greatest freedom to choose techniques and to modify the programme as the work proceeded. The persistent and obstinate fact about research was that it produced, even in the early stages of an investigation, completely unexpected results which could render a long-term plan useless.

A danger in organizing co-operative work, Mr. Morrogh considered was the natural tendency to load the programme with secondary objectives and, as a result, frequently the original primary objective was lost sight of. The often-recognized desire to organize and administer research like a business had provoked Dr. Mees of Eastman Kodak to make the following remark: 'The best person to decide what research work shall be done is the man who is doing the research. The next best is the head of the department. After that, you leave the field of best persons and meet increasingly worse groups. The first of these is the research director, who is probably wrong more than half the time. Then comes a committee, which is wrong most of the time. Finally, there is the committee of company vice-presidents which is wrong all the time.'

In spite of these difficulties in co-operative research work, Mr. Morrogh said that this country had developed a considerable reputation for organizing this activity and overseas visitors were always impressed by the freedom and opportunities afforded to research workers and research organizations by the foundry industry of this country.

Finally, Mr. Morrogh ended his lecture by saying "participation by the industry in research involves a preparedness to put forward constructive suggestions in the light of real industrial problems; to follow the progress of research work, to discuss its applicability, to be prepared to apply its results, and to keep the research worker informed of the effect of their application."

Invitation Luncheon

After the presentation of the Edward Williams lecture, members were joined by the ladies for luncheon in the Winter Gardens, Malvern, by invitation of the Birmingham branch of the Institute. This function was an informal one, but the opportunity was taken to present silver condiment sets to Mr. and Mrs. C. H. Wilson as a gift from the Institute to commemorate their year of office.

After luncheon, the ladies attended a fashion show, while their menfolk repaired to the Festival Theatre auditorium or the Priory Lodge Hall in the Winter Gardens according to which of two simultaneous technical sessions they wished to attend. In all, six technical papers were presented and discussed during the afternoon (abstracts from these will shortly be printed in the JOURNAL).

ANNUAL BANQUET

On the evening of Wednesday, following a reception at the Winter Gardens by the president and Mrs. Shotton, there was held the annual banquet of the Institute. This was a brilliant affair, attracting an attendance of close on 500, including many guests prominent in the foundry and kindred

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industries and particularly representatives of the firms which had offered hospitality for the works visits of the conference. Seated at the top table with Mr. G. R. Shotton were the Most Hon. the Marquess of Exeter, K.C.M.G. (chairman, Birmid Industries, Limited), Councillor H. F. Lewis, J.P. (chairman, Malvern UDC); Mr. N. P. Newman, C.B.E., J.P. (president, Joint Iron Council, past-president IBF); Mr. C. H. Wilson (immediate past-president); Professor F. W. Shotton, M.B.E., SC.D., F.R.S. (Dean of the Faculty of Science, University of Birmingham); Mr. D. A. Richards (senior vice-president); Mr. F. N. Lloyd (director, F. H. Lloyd & Company, Limited); Mr. W. H. Harper (director, John Harper & Company, Limited); Mr. W. E. Braddock (managing director, Duport Foundries, Limited); Mr. G. Adams (president, Australian (Victoria) branch); Mr. E. Player (director, Sterling Metals, Limited); Mr. G. R. Webster, F.I.M. (junior vice-president); Mr. H. E. Hill (chairman, Birfield, Limited); Mr. E. C. Marsland (chairman, Charles Carr, Limited); Mr. S. Walker (chairman, Shotton Bros., Limited); Mr. A. J. N. Brown (president, Association of Bronze & Brass Founders); Mr. G. C. Paterson (president, Foundry Trades' Equipment & Supplies Association); Mr. T. C. Edwards (president, Refractories Association of Great Britain); Mr. W. Brindley (director, Dartmouth Auto Castings, Limited); Mr. K. Marshall (director, Joint Iron Council); Mr. C. F. Joseph, B.S. (director, General Motors Corporation); Professor E. C. Rollason, M.SC., PH.D., F.I.M.; and Mr. R. V. Dowle (director, Birmingham Aluminium Casting (1903) Company, Limited), most of whom were accompanied by their ladies.

After the "Loyal Toast," Mr. C. H. Wilson proposed: "The Town and Civic Authorities of Malvern" and the response was made by the chairman of Malvern UDC, Councillor H. F. Lewis. The toast of "The Institute of British Foundrymen" was proposed by the most hon. the Marquess of Exeter and Mr. G. R. Shotton responded. Mr. D. A. Richards proposed "The Guests" and Professor F. W. Shotton responded. The interest and quality of the speeches at this function was noteworthy and the opinion was expressed that these were the best speeches ever to be made at an annual banquet of the Institute. Music during dinner and for dancing was played by the Harry Engleman Trio and Orchestra. During the banquet proceedings, the opportunity was taken of presenting all the ladies with a souvenir posy basket in cut glass—a conference gift which they will undoubtedly cherish as a memento of a very happy occasion.

(To be continued)

RICHARDSON, WESTGARTH & COMPANY, LIMITED, marine, turbine, electrical, and general engineers, of Wallsend-on-Tyne—A further fall in profits would seem to be inevitable and in view of the immediate profit prospect a reduction in dividend for the current year must be regarded as likely, states the chairman, Mr. O. J. Philipson, in his annual review.

Lighting in Factories

The Department of Scientific and Industrial Research has published a Factory Building Study on the Lighting of Factories.* The Study, which is well illustrated with diagrams and photographs, emphasizes that a building that has bad lighting makes an inefficient factory where work will proceed more slowly, less accurately and with strain upon the workers. Attention is also drawn to Section 5 of the Factories' Act requiring the effective provision of sufficient and suitable lighting in factories.

The first section of the Study deals with the principles of good lighting and enumerates recommended levels of illumination for a number of different factory processes. The following levels are specifically recommended for foundrywork:

Recommended Levels of Illumination in Factories.

	Lumens per sq. ft. (amount of artificial light falling on a surface).	Percentage daylight factor.
Fine coremaking, fine moulding and casting	20	4
Rough coremaking, rough moulding and casting	10	2
Shaking-out, tumbling	7	1.4

Note.—A completely overcast sky is considered to give 500 lumens per sq. ft. out of doors:5 lumens per sq. ft. is equivalent to 1 per cent. day light.

Glare and Distribution

This section of the Study stresses the need to reduce glare: to eliminate flicker (some people are more sensitive to this than others, and accidents may be caused when the rapid variation in the light source may make moving parts appear to be moving differently from their actual motion, or even to be still); the need to ensure good distribution of light over the whole interior with predominantly light colouring on the surfaces of floor, walls and ceilings, and to maintain a suitable background for the performance of work.

The second section of the Study discusses the application of the principles of good lighting to the design and maintenance of factory buildings. In regard to design, stress is laid on the need to allow for obstruction by tall machines, storage racks and partitions, as well as for possible future changes in production methods. To secure good distribution of light over the whole interior, unilateral systems (such as the north light roof) should be avoided, and light colours should predominate on surfaces and floors; the provision of safe and easy means of access for cleaning glazing is important, and penertation methods using horizontal or low-pitched glazing will generally be more efficient that vertical or steeply-pitched glass. A useful table gives the wattage, rated life and average efficiency of some typical artificial light sources used in factories.

* Factory Building Studies No. 2; price 3s. 6d. (3s. 10d. post free) from HMSO.

SALE OF DIESEL ENGINES manufactured by F. Perkins, Limited, Peterborough, throughout America and Canada is to be handled by the Chrysler Corporation's marine and industrial division, Detroit. A recently formed Perkins subsidiary in Detroit called the Perkins Engine Company, Inc., will be responsible for the development of the American market and for liaison with US manufacturers using Perkins products.

SECTION DEVOTED TO THE TECHNOLOGY OF PRODUCING DIMENSIONALLY-ACCURATE CASTINGS

Manufacture and Uses of some Industrial Refractory Crucibles*

By F. George, M.I.B.F., and F. W. Haywood, B.Sc., Ph.D., F.R.I.C., F.I.M.

Refractory crucibles of all types are increasing in numbers and complexity, in order to meet the ever-increasing demands of the metallurgist and design engineer. This paper describes crucibles of certain types made from refractory materials (excluding carbon, graphite, plumbago, Salamander, and the like); their manufacture and application to certain specific melting processes. In most cases, the method of heating is by electrical means and the various features of such crucibles for indirect-arc melting, induction melting and vacuum induction melting are outlined. Mention is also made of the general range of metals and alloys melted, and the behaviour of various types of crucibles working under normal works-conditions.

Although crucible melting, as such, is limited by size considerations to smaller volumes than are obtained normally from rammed linings, there are many advantages accruing, namely—low melting-loss; extreme flexibility and convenience of handling and higher purity of melts with less overall contamination. The advent of the jet engine, requiring the complex turbine-blade materials, has necessitated an ever-increasing demand for quality crucibles.

All crucibles dealt with in this paper are prepared by using organic silicates as binders. The one most frequently employed is ethyl silicate and no mention will be made of the theory underlying the use of this material, as it has already been dealt with at length elsewhere[1]. Alkaline hydrolysis is practised in the manufacture of all types of crucibles.

Manufacture of Crucibles

At the moment, crucibles are produced in a variety of shapes and sizes, but from raw materials of a general basic specification as given in Table 1.

Whilst these grades account for the majority of standard crucibles used in industry at the moment, other mixes of an experimental nature are in course of development and undergoing works trials. However, it is too early to give facts and figures concerning these developments.

It will be appreciated that in any one grade of material, there are a variety of mixes required for different types and sizes of crucibles and such variations are obtained by using mixes corresponding to set sieve-analyses. These are too numerous to detail at length, but Table 2 gives typical mixes for a number of standard crucibles.

All crucibles are made by casting techniques, using standard moulds and cores. These latter are made either in wood or metal, depending upon the output required from a given mould. In the case of a small number-off, wooden moulds are used, but for a repetitive size, metal moulds and cores made throughout in aluminium are employed. Throughout the whole process, the refractory mixes never come into contact with mild steel, so

TABLE 1.—*Typical Specifications for Types of Crucible Materials.*

Property.	Grade of Material—Typical Analysis, per cent.			
	P.	H.S.	A.	M.G.
Loss on ignition ..	0.1—0.2	0.4	—	0.5
Silica (SiO_2)	24—26	7.5	0.25	2.0
Alumina (Al_2O_3) ..	71—72	86.5	99.5	1.77
Ferric Oxide (Fe_2O_3) ..	0.9—1.0	0.9	0.01	0.24
Titania (TiO_2) ..	0.8—0.9	3.0	—	—
Magnesia (MgO) ..	0.1—0.2	0.1	—	94—95
Lime (CaO)	0.7—0.8	1.0	0.4	0.10
Potash (K_2O) }		0.3	—	—
Soda (Na_2O) .. }	0.7—0.8	0.1	0.20	—
Class of material ..	Sillimanite	Alumina type	High-alumina type	Magnesia type

TABLE 2.—*Typical Mixes for Standard Crucibles.*

Sieve Sizes.	Grade of Material and Sieve Analysis, per cent.		
	Grade P.	Grade H.S. and A.	
	H.-f. crucible.	Arc crucible.	H.-f. crucible.
+ 10	13.5	7.8	3.7
− 10 + 22	13.9	18.3	15.4
− 22 + 30	14.9	20.7	24.9
− 30 + 85	12.2	24.0	23.6
− 85 + 100	28.7	2.5	2.3
− 100 + 200	13.6	16.0	2.6
− 200	3.2	10.7	27.5

* Paper presented at the second annual conference of the British Investment Casters Technical Association (BICTA); the Authors are attached to Refractory Mouldings & Castings, Limited.

that iron pick-up is avoided. While this factor is not so important in the manufacture of crucibles, it is vital for other specialized products.

Stages

The various stages in the manufacture of crucibles are as follow. Having selected the appropriate moulds for a given size of crucible, all internal surfaces are thoroughly, but lightly, covered with a special drawing lubricant, the mould assembled and placed in position on a static vibrator. A weighed quantity of the particular grade of material—previously passed over powerful electromagnets to remove all traces of free iron and magnetic materials—of the requisite sieve-analysis is placed in either a rubber bucket or a rubber-lined bucket. To this is added in this order, the correct volume of aminized ethyl-silicate for the weight and type of refractory being used, followed immediately by the correct volume of an alcohol/water solution of the appropriate t.w.c.a. (total water content of the alcohol). The contents of the bucket are then stirred mechanically by means of a rubber-lined stirrer for a given time and this mixture fed to the mould. At this stage, in order to assist the flow of the material, the vibrator is started up and kept on until the mixture has gelled.

Hydrolysis, Baking and Firing

As mentioned earlier, the alkaline method of hydrolysis is employed. The ethyl silicate is rendered alkaline by using appropriate organic-amines, the resultant solution having a reasonable shelf-life. This solution gels on the addition of an aqueous alcohol solution, the volume and t.w.c.a. of which, at a given temperature, controlling the extent of the gelling time; this latter varies between 15 and 45 min. for crucibles. The choice and actual concentration of the organic amines also affect the gelling time, but it is common practice to fix these for a given ethyl-silicate solution and vary the volume and water content of the aqueous alcohol solution[2 3 4].

Assume that for a particular crucible, the gelling time was, say, 40 min., then some 5 to 10 min. before gelling the mould is placed under a rough vacuum (27 to 28-in. Hg) and kept under this vacuum until gelling is completed, after which the vacuum is released and the mould stripped. This is for densification of the crucible by removal of air. The crucible is now quite handleable and is transferred to a slow moving conveyor for air drying followed by infra-red drying. After a given total time of drying, the crucibles are transferred to a baking oven of special design. All types and sizes of crucibles are jigged in austenitic-steel baskets of standard design which are used throughout manufacture for transference of crucibles. All interior metal parts of the baking oven are made either in stainless steel or aluminium alloy. The oven is electrically heated by sheathed elements and thermostatically controlled. When the oven is full of crucibles, the lid is luted down and all air purged from the oven by means of Exogas derived from raw town's gas. After the passage of Exogas, such that the free space volume in the oven has been changed at least six and preferably ten times, the heaters are switched on and the oven brought up to temperature (over the range 110 to 175 deg. C.) and the ware baked for some 6 hours at temperature. The actual time at temperature varies with the thickness of the ware being baked. During purging, baking and cooling of the ware, right down to ambient temperature, the atmosphere of Exogas is maintained in the baking oven, under conditions of constant flow. When the ware has cooled down to ambient temperature, the Exogas is flushed from the oven by means of compressed air and the ware removed for high-temperature kilning. This is carried out in oil-fired kilns, the temperature and time at temperature depending upon the grade of

FIG. 1.—*General view of crucibles during manufacture.*

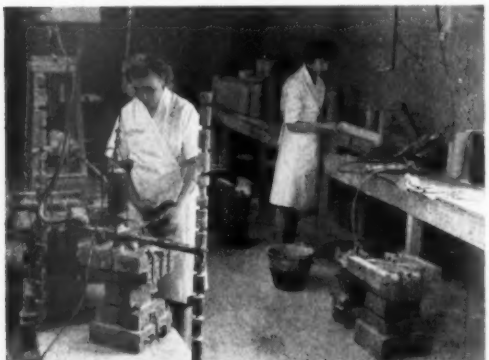


FIG. 2.—*View of infra-red drying of crucibles on a conveyor system.*

FIG. 3.—*Baking oven and atmosphere-generating plant.*

material used for the crucibles. Table 3 gives representative figures taken from temperature records on the shop floor.

TABLE 3.—*Typical Kilning Cycles for Crucibles.*

Grade of material.	All figures given below are for a full load of crucibles in a kiln.			
	Time to attain max. temp. (hr.)	Maximum temperature deg. C.	Soak time at max. temp. (hr.)	Cooling time. (hr.)
P	6–7	1,450	2–3	12–14
H.S. ..	6½–7½	1,500	3–4	14–16
A	6½–7½	1,550	4–5	14–16

After kilning, the crucibles are very carefully inspected and any faulty ones rejected. In the case of h.-f. induction crucibles, where the thickness of the wall is vital, calliper gauges fitted with micro-switches are used to determine whether the crucibles have a uniform wall-thickness. This gauge is set within limits of approximately ± 0·005 in. of the defined thickness. Finally, the top rims are ground to length on a vertical twin-grinder. After passing inspection, all h.f. crucibles are enclosed in polythene bags and sealed. It has been found necessary to do this in order to deliver crucibles in as dry a condition as possible to users. Before doing this, crucibles tended to absorb moisture from the packing material and from the atmosphere. Figs. 1 to 4 inclusive show crucibles in the course of manufacture, from pouring, through stripping, drying, baking and kilning.

Crucibles for Indirect-arc Melting

Crucibles for indirect-arc melting are made in a variety of sizes and Fig. 5 shows representative types. Reading from left to right of the photograph are shown a 10-lb. capacity crucible with electrode settings on the centre-line of the pot; a 30-lb. capacity crucible; a 20-lb. capacity crucible and a 15-lb. capacity crucible where the electrode holes are above the centre-line of the pot. The crucibles illustrated are all made in grade H.S. material, although other grades are in use for arc melting, mainly P and A. The type of indirect-arc melting furnace using these crucibles is too well-known to need description[5] but a typical installation is shown in Fig. 6, where the operator is pouring the molten material into a preheated mould. The ease with which crucibles can be changed facilitates the working of numerous different alloys without fear of contamination. In this connection, a wide variety of alloys is melted in these furnaces, such as copper-base alloys; mild steel; low-alloy steels; stainless steels; austenitic-alloy steels; Nimonic alloys; tool and die steels; high tungsten steels; general turbine-blade alloys and the like. For more details of special alloys so melted, together with the mechanical properties of the alloys, reference should be made to two recent papers given before BICTA[6, 7].

One of the factors affecting the final cost of parts precision cast by indirect-arc melting, is the life of the crucible and here, whilst no hard and fast rules can be laid down, experience to date has shown the figures in Table 4 to be typical.

TABLE 4.—*Typical Figures for the "Life" of Crucibles used for the Indirect-arc Melting of Investment-casting Alloys.*

Alloys melted.	High tungsten steels.	Stainless steel.	Nimonic alloys.	Mild steel.
Average life of crucibles	250–300 melts	300–400 melts	90–150; up to 500 750–1,000	40–150 melts

Most crucibles fail ultimately by erosion and slagging at the metal interface and although no "life" figures can be guaranteed on any crucible,

FIG. 4.—*Kiln packed with stacked crucibles.*

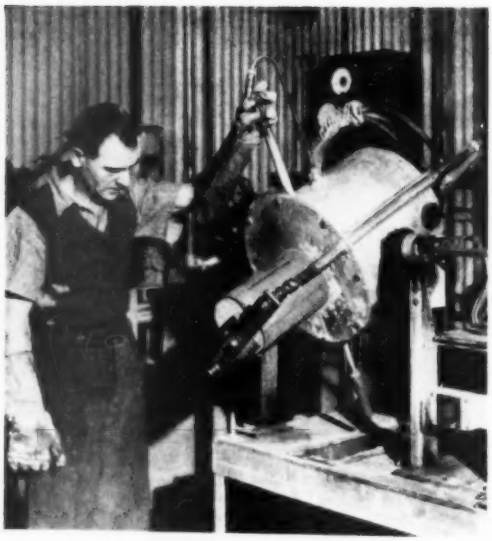
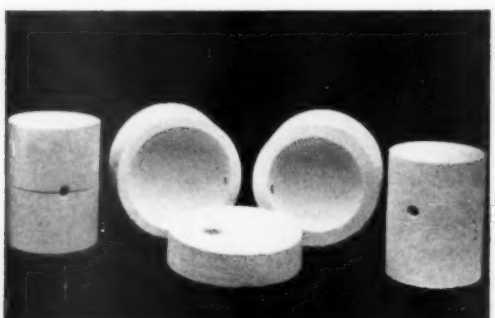


FIG. 6 (*left*).—*Indirect-arc melting-furnace. (Courtesy, Rolls-Royce Limited).*

much depends on the careful operation of the plant as a whole; such factors as striking of the arc, loading of alloy and control of temperature being very important. Continuous operation of the plant working 120 hr. per week has given the best "life" figures from these crucibles.

Occasional faults arising directly from the use of crucibles are inevitable, but on the whole, life figures have been considered satisfactory. Other troubles reported have arisen from the actual size of the crucible (smaller sizes being preferred to larger sizes), occasional slag contamination of the alloy and a general preference for crucibles of the H.S. and A. grade. As a general rule, crucibles of the MG grade, whilst capable of higher temperature use, have not proved as satisfactory as might have been anticipated, probably due to the higher coefficient of thermal expansion of this material.

FIG. 5.— *Selection of typical indirect-arc melting crucibles.*



High-frequency Induction-melting Crucibles

In this field, the whole range of materials given earlier in this paper is employed and typical examples are given in Fig. 7. Reading from left to right of this photograph the various crucibles are:—50-lb. capacity crucible in PSC material; 20-lb. capacity in H.S. material; 10 to 15 lb. capacity, one in P, the other in A material, and a 50-lb. capacity in P material. All capacity figures refer to ferrous-alloy melts. At the present time, a plea for some attempt at standardization of h.-f. crucibles is not out of place, as no less than sixty different moulds have to be carried in stock to meet requirements varying in size from 6 cm. i.d., by 7 cm. o.d. by 7-cm. long, up to 13½ in. i.d. by 15½ in. o.d. by 27 in. long, for capacities varying from a few ounces up to 50 lb. Other variations relate to the form of the mouth of the crucible, whether plain or lipped. A very wide variety of materials is melted in crucibles heated by induction, and in Table 5, only a brief indication is given of these, together with crucible life from a selection of typical users.

It is well known and appreciated that crucible life using this method of melting (Fig. 8) cannot compare with indirect-arc melting, due to a number of factors. First, there is the stirring effect of the h.-f. eddy-currents causing more erosion and slagging and, secondly, in order to melt the material rapidly and economically, the crucibles must be within reasonable proximity of the induction coil and have as thin a wall as possible consistent with reasonable life. Generally speaking, the less-highly-alloyed materials give a shorter crucible-life than when melting highly-alloyed materials, irrespective of the grade of material used for the crucible.

Vacuum Induction-melting Crucibles

In the vacuum-induction type of furnace, as in induction furnaces, the heat is generated by eddy

FIG. 7.—*Examples of typical h.-f. induction-melting crucibles.*

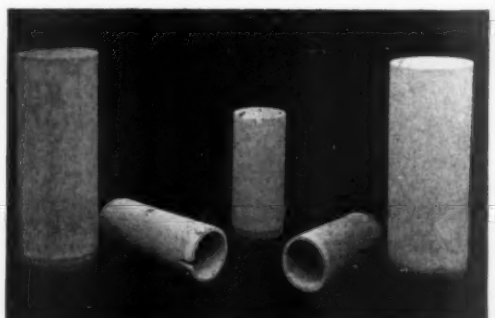


TABLE 5.—*Typical "Lives" of Induction-heated Crucibles.*

Particulars of crucibles.		Some of the main alloys melted.	Representative "life" of crucibles. (Number of melts).	Notes and comments.
Grade.	Capacity. (lb.)			
P	20	Nitriding steels; stainless steels and steels to specn. S.110, S.106, S.80, En. 19, En. 30–35, En. 3	Nitriding steels 6 to 7 Stainless 12	20-kw induction set used; thicker crucibles preferred.
P MG	6	5 per cent. Cr/Mo steel; 17/2 stainless steel; 18/8 austenitic steel; 2 per cent. Ni/Cr/Mo steel; 0.6 per cent. carbon steel	Best life 14+ Average 5 to 7 Worst 4 to 5	15-kw set used; normally 6 lb. charges. Melting temperature 1,520 to 1,620 deg. C.
P & HS & A	20	18/8; C and low-alloy steels; magnet steels; Invar.; 6 per cent. chromium steels; die steels, ball-bearing steels	Carbon and alloy steels 3 to 4, high-alloy 2 to 3	Erosion rate increased with high-purity materials.
HS MG	10 to 20	Mild steel; low-alloy steels; stainless steel; turbine-blade alloys	10 to 40, dependent upon material	Stirring effect of high-frequency current shortens crucible life.
P	20	Carbon steels; stainless steels; cobalt-base alloys; non-ferrous alloys	2 to 3, but have had up to 24	Negligible pot erosion and corrosion. High-porosity spot caused trouble.

currents set up in the high-frequency current flowing through a water-cooled induction coil surrounding the crucible. With most materials, the eddy currents are induced directly in the material being melted. The subtle difference, however, is the absence of air in the vacuum type, which is advantageous in producing materials of high quality. Inductive heating is particularly good for producing vacuum-melted alloys because the entire alloy material can be kept molten during purification, thus assisting removal of gases contained in the charge; the inductive field agitates the charge so that purification is speeded up and also gives a more-homogenous melt and the temperature is limited only by the quality of the material composing the crucible. The greatest use of vacuum melting is to prevent pick-up of gases and to remove gases already present in the charge. The primary benefits resulting from the absence of gases are, greatly reduced inclusions, elimination of pinholes caused by gas products, and precise control of alloy content by eliminating loss of alloy material through oxidation.

Vacuum-melted metals possess many advantages, some of which are as follow:—Cleaner metals and alloys; greater strength at high temperatures; improved ductility and machinability; longer fatigue-life; better conductivity both thermally and electrically; sounder materials and of better homogeneity; improved magnetic properties and a greater yield of usable metal from a given ingot. Vacuum-induction furnaces are now available to industry with capacities of 12 to 17 lb.; 17 to 50 lb.; 100 to 150 lb.; 300 lb.; 600 lb.; 1,000 lb.; and 2,400 lb. (All weights given refer to molten steel). Not all the sizes given can employ crucibles, and up to the present time the ceiling appears to be up to 300-lb. capacity; beyond these figures rammed linings are used. Fig. 9 shows a typical vacuum-induction furnace of 300-lb. capacity, where the crucible can be seen quite clearly.

The alloys mentioned previously under both arc and induction melting can be melted under vacuum conditions and crucibles in A or MG grades have given useful life figures as below:—Grade A—up to 25 melts on nickel-base alloys, ball-bearing steels and high-permeability alloys. Grade MG—15 to 20 melts on similar alloys, and Grade A and MG—up to 120 melts (in certain cases of alloy steels and nickel/chromium alloys).

With the use of these crucibles, most of the properties outlined above for vacuum-melted materials have been achieved, with reasonable crucible-life.

FIG. 8—*Small induction-melting furnace. (Courtesy, Trucast Limited).*

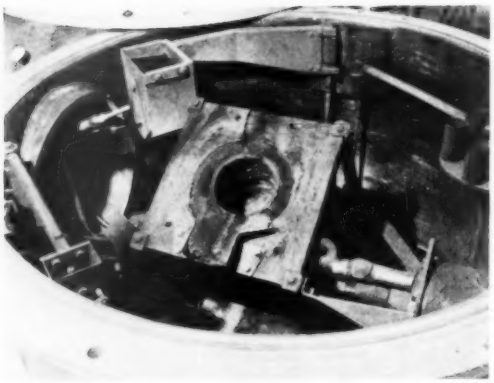


FIG. 9—*Vacuum induction-melting furnace, showing crucible. (Courtesy, G. L. Willan Limited).*

Whilst space does not permit of all the uses of melting crucibles, one other usage is worthy of mention. This relates to standard crucibles used in the melting of small batches of special glasses. Usually the crucible acts merely as a support for a pure platinum liner which houses the glass being melted, and melting is carried out in a gas-fired lift-out furnaces. Crucible life is very largely a function of method of operation, and in one or two cases the duty is very severe, due to the crucibles being subjected to as many as twelve cycles per day from 1,500 deg. C. down to ambient temperature. Nevertheless, crucible life under such adverse conditions of thermal shock has averaged 36 to 40 melts. Crucibles fail generally by splitting down one side, due to thermal shock in cooling in air from 1,500 deg. C. and the use of cold tongs for handling the crucibles.

General Conclusions

Some of the advantages which result from the use of good-quality crucibles for melting are as follow: (1) The convenience of handling and extreme flexibility, permitting high-purity melts with less overall contamination; (2) low melting-losses; (3) low pick-up from the crucible, due to the use of high-grade materials; (4) use of the ethyl-silicate process giving a binder which does not contribute contaminants to the crucible materials and which is inert at the melting temperature normally employed; (5) ethyl-silicate process enables close dimensional-tolerances to be maintained and hence crucibles of easily-reproducible size and shape; (6) better all-round mechanical properties of the materials cast from such crucibles, and (7) the general physical characteristics of these crucibles such as, good resistance to thermal shock, reasonable strength at temperature, low slagging characteristics, and low coefficient of expansion (except grade MG) give good life.

Acknowledgments

The Authors express thanks to many friends in the investment-casting industry for collaboration in general and willingness to give detailed information relating to the use of crucibles in this industry. Finally, thanks are due for permission to publish.

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[3] British Patent 612,622.
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Small Holes in Large Castings

The use of conventional sand cores for obtaining quite small holes in heavy-section iron castings can be a source of trouble in the fettling shop, as these conditions favour the entry of metal into the core, with resulting difficulty in fettling. The French *Journal d'Informations Techniques des Industries de la Fonderie* has published an interesting survey of this subject and has suggested the insertion of either metallic or ceramic tubes, with emphasis on the former. The tubes used must be meticulously clean—that is free from oxide, dirt, oil and grease, and be bone dry. Moreover, it is wise to shotblast the tubes just before casting.

The size of the tube selected is important and the article recommends that for a section of metal 4-in. thick, a seamless steel tube of $\frac{5}{32}$-in. thick is suitable. When the casting section thickness increases from 4 to 6 in., then a tube of $\frac{3}{32}$ to $\frac{1}{8}$ in. thick is called for. It is reported difficult to find commercially available tubes of small diameter having a thickness greater than $\frac{5}{32}$ in. and for use in castings of great thickness, tubes can be protected by winding around them annealed iron wire of $\frac{5}{32}$-in. dia. or again use can be made of an iron casting carrying a hole drilled to the correct diameter and leaving a wall thickness of $\frac{1}{8}$ to $\frac{5}{32}$ in. For castings of section thickness greater than 6-in., it is best to prepare an iron casting of tubular shape of which the inside diameter is equal to that required (on the blueprint) and the outside diameter from $2\frac{1}{4}$ to 3 in., according to the surrounding mass. The external surface of these inserts should carry serrations about $\frac{5}{32}$-in. deep to help fusion into the casting. In all cases, the tube or hole should be filled with white silica sand, the print parts being sealed off with a plug of green-sand $\frac{1}{4}$- to $1\frac{1}{4}$-in. long, to avoid spillage of sand during moulding operations. When using devices of this type it is advisable that large iron castings should be poured at from 1,250 to 1,300 deg. C.

It is possible to use ceramic tubes, but the method is less common in France. Particularly, however, for making small-diameter, lengthy holes in castings, ceramic tubes made from silica, alumina, magnesia, chammotte or zircon can be adopted. Use is made of a clay bond and the tubes should be stoved at a temperature of about 1,000 deg. C. and special precautions must be taken to avoid fissuring during baking.

Investment-casting Industry Statistics

Committee Report of the British Investment Casters' Technical Association

At the annual conference of the British Investment Casters' Technical Association, held in May, the following report was presented on statistics pertaining to the investment-casting side of British founding. This is probably the first time on which such a summary and market outlook has been made available.

Industry Statistics Committee

The work of the Industry Statistics Committee to date has been concerned with planning a survey of the industry, to provide statistical data as to its capacity and output, materials and processes used, and markets served, and to collect opinion from the industry as to future prospects.

It was decided, in the first place, to circularize a questionnaire to all investment founders known to be producing industry-type castings; the form of this questionnaire was based upon, but not identical with, that successfully employed by the Investment Castings Institute of America some years ago. The drafting of the questionnaire occupied several months, but it was finally issued on November 20, 1959; the Council in the meantime had agreed to appoint the Association's auditors (Peat, Marwick, Mitchell & Company) to receive the replies, and to report in a form indicated by the Committee. Replies from industry were received up to January 31, 1960, and Peat's report dated February 19, 1960, was reviewed by the Committee on February 23 and issued to all participants on March 3, 1960.

The report on the survey will have an obvious interest to each participant, who can compare his own replies with the overall picture presented, but the Committee has considered that some general observations may be useful to focus attention on what it believes to be the salient features.

Structure of the Industry

It will be noted in the first place that 14 replies were received from 18 companies to whom the questionnaire was sent. This is a highly satisfactory response, and it may be said to represent about 85 per cent. of the industry. Of these 14 companies, 12 commenced investment casting between 1940 and 1950, the remainder starting more recently. Only four out of 13 are independent companies, but 10 out of 14 supply less than 30 per cent. of their output to their parent organization; the remaining four make over 90 per cent. for themselves.

The total number of employees engaged in the industry would appear to be about 2,000, of whom approximately 10 per cent. are inspection staff, 10 per cent. administrative or clerical staff, and the remainder engaged on production. The average area occupied per employee is of the order of 200 sq. ft. One third of the firms have separate process-development departments.

Capacity and Turnover

The Committee has attempted to derive from the information supplied as to hourly capacity of metal melted, and from other information what the annual value of the turnover of the industry may be. It has been necessary to make a number of assumptions as to hours worked, average price of castings (ferrous and non-ferrous), yield of good castings to metal melted, and, of course, the previously stated assumption that the replies represent about 85 per cent. of the total trade. However, it would appear that the annual turnover of the industry is upwards of £5,000,000.

The hourly melting rate taken is about 50 per cent. of the maximum installed capacity that can be derived from the replies to the questionnaire, or about two thirds the mean values of the weight ranges against which answers were placed. Therefore, making allowance for unused capacity and multiple-shift melting, the industry would appear to have a practicable maximum potential of perhaps twice the figures quoted above.

Production Processes

The replies to the question on type of melting furnaces used show an overwhelming preponderance for indirect-arc and induction-type furnaces, with only 5 per cent. of the output of one company being produced in vacuum. It is possible that this later figure may increase if subsequent surveys are made. Similarly, there is little use being made of other pattern materials than wax.

The returns of the types of mould used are interesting primarily in relation to the use being made of the ceramic-shell technique. Six of 13 companies make no use of this process, while the remaining seven make between 5 and 50 per cent. of their moulds by this method. Here again it will be interesting to observe future trends.

Inspection

The high standards of inspection which the major part of the industry has traditionally had to accept is reflected in the information provided on inspection equipment and personnel. The ratio of inspection to production personnel varies mainly between 1:5 and 1:10, and about 80 per cent. of the industry is equipped with radiographic, mechanical-test, and surface-flaw detection equipment, and 35 per cent. with ultrasonic-inspection facilities. It is interesting to note, however, that all those companies with surface-flaw detection equipment list surface flaws as a principal reason for customer rejects, and all those listing internal flaws as a primary or secondary reason for rejection have radiographic and, in some cases, ultrasonic

Investment-casting Industry Statistics

inspection, equipment. While the excellent inspection facilities available in the industry may in certain markets aid the prestige of the industry, they are regarded by many as a stumbling block to future development in other directions, because of the higher overhead cost that they necessarily impose. The proportion of production subject to official inspection varies between a maximum of 100 and a minimum of 10 per cent.; but the returns reveal that there is a little difference between the ratio of inspection to production personnel employed as between companies primarily working to official inspection, and those primarily engaged on commercial-quality castings. This would appear to be a matter worthy of further discussion within the industry.

Product and Markets

Using a procedure suggested by the Committee, Peat & Company derived index figures, relating the percentage number and the percentage value of total castings production in 1958, which appear to suggest that castings in the weight range 1 to 4 lb. are better (by a factor of 2) priced than those below about ¼ lb. in weight. It is not possible from the data to advance any explanation of this factor, not to be certain that the index figure reported is a reliable guide, but it is a matter which may merit further inquiry in relation to the development of new markets.

Over 60 per cent. of the industry appears to be interested in the casting of non-ferrous alloys, in one case 30 per cent. of output being in these materials. This adds some confirmation to an impression that might be gained from a survey of technical literature—particularly American periodicals—which seems to suggest that there is an increasing outlet for such castings, or that the industry is interested in stimulating a demand for such components.

A comparison between the analysis of markets supplied in 1958 and the indications given as to those offering the best potential for future development is of interest. In the former case using index figures derived by multiplying the number of firms engaged in each market by the highest percentage value of sales, and in the latter case using the points values given to the replies by Peat & Company the following rating appears:

Market	1958 *Trade*	*Future Potential*
Aircraft engine	First	Second
Gas turbines, other than aircraft	Second	First
Textile machinery	Third	Sixth
Aircraft air-frame	Fourth	—
Instruments, other than aircraft	Fifth	Third
Aircraft instrument	Sixth	—
Steam turbines	Seventh	Fourth
Medical and dental	—	Fifth
Dairy and food	Eighth	Seventh

Recent announcements by the Government with respect to the aircraft industry came too late to be reflected in the replies received as to future potential markets, and a new survey might show a different order. Another point of interest is the diversity of markets served, eight categories having been added to the questionnaire as issued to make a total of 29 market classifications.

Major Problems confronting the Industry

The Committee is gratified by the fact that 10 of the 14 companies went to considerable trouble to amplify their answers to the specific questions with comments on problems confronting the industry. An analysis of these remarks identifies the following matters requiring attention, in order of priority:

(1) Education of designers to improve the diversity of markets supplied, and education of buyers to compare the cost of investment castings with the cost of finished or semi-finished components produced by other processes; provision of accurate technical data.

(2) Reduction of cost, particularly problems of carrying elaborate inspection facilities not required for non-aircraft markets.

(3) Improvement in process control, requiring improved quality of staff.

It is appropriate for the Committee to comment that numerous facets of the problem summarized in item (1) above are precisely those which are engaging the attention of the Technical Publicity and Metal Specification Committee of the Association, and no doubt they will be encouraged to have this confirmation of the urgency and importance of their work.

The Industry Statistics Committee has not yet had time to consider fully all the implications arising from this initial survey, and to formulate formal recommendations to the Council and membership, but it would clearly be to the benefit of the industry that some of the data should be collected and made available to participants at regular intervals in the future, and that in some respects the data is incomplete. The excellent response obtained suggests that these views are shared by the participants, and that they may be willing to continue this type of activity.

(The report is signed by Mr. W. S. Fowkes, chairman of BICTA's Statistics Committee.)

Shaw Process Licensees Meeting

An international meeting of Shaw Process licensees is to be held in Paris from October 17 to 19, whereat delegates will discuss for the general benefit, developments and "know-how" arising from experience in operating the Process. There are to be four technical sessions on two days, held in the lecture theatre of the *Société des Anciens Elèves des Ecoles Nationales d'Ingénieurs Arts et Métiers*. In addition, two visits have been arranged to the works of Parisian licensees.

Correspondence drawing attention to the meeting discloses that throughout the world there are now no fewer than 68 licensees of the Shaw Process. Furthermore, prospects of additional progress are good, as a new concern, Shaw Process Development (India), Limited, has recently been formed, with demonstration and training facilities in Calcutta.

Personal

Dr. RONALD HOLROYD, deputy chairman of Imperial Chemical Industries, Limited, has received the honorary degree of Doctor of Science of Hull University.

Mr. PATON MILLAR has been appointed managing director of Thomas Allan & Sons, Limited, Thornaby-on-Tees (Yorks), a company in the Federated Foundries group.

New post of London director of the Aveling-Barford, Limited, group, has been taken by Mr. T. H. B. WHITING. Mr. O. A. SINGLETON has been appointed London and home counties manager of the company.

To mark his retirement on completion of 51 years' service, 40 of which he had been foreman, at Callendar Abbots & Dobbie Forbes, Limited, Larbert, Mr. JAMES J. SHAW, received presentations from directors and staff.

Wallsend County Secondary Technical School is to be officially opened on July 15 by Mr. H. H. MULLENS, chairman of A. Reyrolle & Company, Limited, Hebburn, and of C. A. Parsons & Company, Limited, Newcastle-upon-Tyne.

Mr. MATTHEW REID MOORE, who became general sales manager of Richard Sutcliffe, Limited, mining-machinery and mechanical-handling-equipment makers, of Horbury, Wakefield, earlier this year, has been promoted to general manager.

Mr. W. H. DEMEL, managing director of Harrison (Birmingham), Limited, brassfounders, Birmingham, has retired from the board because of ill-health, and Mr. PHILIP GREEN and Mr. J. M. JAMES have been appointed joint managing directors.

Mr. D. KEIGHLEY, for 25 years works manager for Thomas Smith & Sons (Rodley), Limited, crane manufacturers, Rodley, near Leeds, has retired after 45 years' service with the firm. Presentations have been made to him by the staff and works' employees.

Mr. W. R. GIBB, financial director of W. T. Glover & Company, Limited, a subsidiary of British Insulated Callender's Cables, Limited, and Mr. E. P. G. THORNTON, technical manager (power cables), have been appointed assistant general managers. Mr. Thornton has also joined the board.

Sir WILLIAM ARTHUR STANIER, F.R.S., a director of the Garrard Engineering & Manufacturing Company, Limited, Swindon, (Wilts), and of H. W. Kearns & Company, Limited, Altrincham, has been re-elected president of the Production Engineering Research Association of Great Britain.

Capt. F. T. BOSWELL, R.N. (RETD.), who joined Samuel Fox & Company, Limited, a subsidiary of the United Steel Companies, Limited, earlier this year as assistant welfare officer has been appointed welfare officer. He succeeds Major W. G. A. CARRINGTON, who has retired after 17 years' service

Mr. R. F. G. LEA is to become deputy chairman of CIBA(A.R.L.), Limited, on January 1, 1961. He also becomes joint managing director with Mr. D. A. HUBBARD. Dr. N. A. DE BRUYNE is resigning as managing director of the company at the end of the year, but he will remain on the board.

Mr. G. L. BAILEY, C.B.E., director of the British Non-Ferrous Metals Research Association, is leaving on July 17 for the Rhodesian Copperbelt where he will spend a fortnight visiting the smelters and refineries of the Rhodesian Selection Trust group of companies and the Anglo American Corporation of South Africa.

Mr. ANDREW JOLLIE is resigning from his position as director and general manager of the Steel, Peech & Tozer branch of the United Steel Companies, Limited, on July 31. He will be succeeded by Mr. T. S. KILPATRICK, who is at present director and general manager of Workington Iron and Steel Company.

Mr. J. A. HARVEY has resigned as general sales manager (Bisol) of the chemical division of the Distillers Company, Limited, and Mr. R. M. F. FENNING (formerly marketing manager) has been appointed in his place. Mr. A. A. PUDDICK is now marketing manager, and his successor as export sales manager is Mr. J. TEDD.

Mr. H. SOUTHERN, managing director of G. P. Wincott, Limited, furnace builders, of Attercliffe Road, Sheffield, has been appointed the first president of the Society of Furnace Builders, of which he has been chairman for the past 16 years. Mr. C. G. PETTIT, assistant managing director of the Incandescent Heat Company, Limited, of Totley, Sheffield, succeeds Mr. Southern as chairman.

On July 11, Mr. A. J. CROOK relinquishes his post with Arthur Shaw & Company, Limited, Willenhall, to take up an appointment with Idoson Motor Cylinder Company, Limited, of Hainge Road, Tividale, Tipton, Staffs. (Mr. Crook who is secretary of the Birmingham branch of the Institute of British Foundrymen, asks that members in that area shall use his new firm's address for correspondence on Institute matters.)

INCORPORATED ADVERTISING MANAGERS' ASSOCIATION announce that at the 23rd annual general meeting the following officers were elected for the year 1960/61:—President, Mr. Frank Edwards (Ingersoll, Limited); chairman, Mr. Ray Crew (Monsanto Chemicals, Limited); vice-chairman, Mr. N. R. A. Biles (C.A.V., Limited); hon. secretary, Mr. E. P. Collins (the Morgan Crucible Company, Limited); hon. Press secretary, Mr. Roy Bagot (Kelvin & Hughes, Limited, and group), and hon. editor of the *IAMA News*, Mr. Leslie Gibbes (Odhams Press, Limited).

Mr. J. F. E. d'A WILLIS has been appointed to the executive office of chairman of Hall-Thermotank, Limited, in the place of Mr. IAIN M. STEWART, who has resigned for domestic reasons. Mr. Stewart remains a director of the company and chairman of Thermotank, Limited, its subsidiary. It is understood that Mr. Stewart is also resigning from appointments other than in the Hall-Thermotank group. Mr. J. C. AKESTER has resigned from the board of Hall-Thermotank, but retains the chairmanship of its subsidiaries, Vent-Axia, Limited, and Axia Fans, Limited.

Mr. G. RONALD PRYOR, chairman and managing director of Edward Pryor & Son, Limited, Sheffield, has been re-elected president of the Institution of Production Engineers for the year 1960/61. Mr. Pryor who is a past-president of the Sheffield section of the Institution, has served on the Council of the Sheffield Chamber of Commerce since 1951, and is vice-chairman of the education committee of the Chamber. He is also vice-chairman of the Council of the Production Engineering Research Association of Great Britain, on which body he has served since 1950. Mr. HAROLD BURKE, group joint managing director of the Concentric Manufacturing Company, Limited, Birmingham, has been elected vice-president of the Institution, and Mr. R. H. S. Turner, director and works manager of Associated Electrical Industries (Manchester), Limited, becomes chairman of the Council.

British Blast Furnaces in the March Quarter, 1960

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the first quarter, 1960.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	—	1	—	1	1	4
Renishaw Iron	—	1	1	—	2	2	2
Sheepbridge	—	2	—	—	2	2	2
Stanton Ironworks: Stanton-by-Dale	—	1	4	—	5	4.2	5
Staveley Iron & Chemical	—	—	4	—	4	3.1	4
Stewarts and Lloyds: Corby	—	4	—	—	4	4	4
Wellingboro' Iron	—	2	—	—	2	1.5	3
TOTAL	—	10	11	—	21	18.8	25

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel Works	—	1	—	—	1	1	1
Darwen & Mostyn Iron	—	—	—	1	1	1	2
Lancashire Steel Manufacturing	—	2	—	1	3	2.5	3
Summers, John	—	2	—	—	2	2	2
TOTAL	—	5	—	2	7	6.5	8

North-West Coast.

Barrow Ironworks	2	—	—	—	2	2	4
Charcoal Iron	—	—	1	—	1	1	1
Millom Hematite Ore & Iron	2	—	—	—	2	2	3
United Steel: Workington	3	—	—	—	3	3	3
TOTAL	7	—	1	—	8	8	11

Lincolnshire.

Appleby-Frodingham Steel	—	4	—	—	4	4	4
Lysaght's Scunthorpe Works	—	3	—	—	3	3	3
Thomas, R., & Baldwins: Redbourn	—	3	—	—	3	3	3
TOTAL	—	10	—	—	10	10	10

North-East Coast.

Consett Iron	—	3	—	—	3	3	3
Dorman Long (Steel): Acklam	—	2	—	—	2	2	4
Redcar	—	—	—	—	—	—	2
Bessemer	—	1	—	1	2	1.4	3
Clay Lane	—	2	—	—	2	2	2
Gjers, Mills	2	—	—	—	2	2	3
Normanby Iron Works	—	—	—	—	—	—	3
Skinningrove Iron	—	2	—	—	2	2	3
South Durham Steel & Iron: West Hartlepool	—	2	—	—	2	2	3
Cargo Fleet	—	2	—	—	2	2	3
TOTAL	2	14	—	1	17	16.4	29

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	—	—	2	2	4
Carron	—	—	1	—	1	1	2
Colvilles: Clyde Iron Works	—	2	—	—	2	2	3
Ravenscraig	—	1	—	—	1	0.9	1
TOTAL	1	4	1	—	6	5.9	10

South Wales and Monmouthshire.

Guest Keen Iron & Steel: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	3	—	—	3	3	3
Steel Company of Wales: Margam	—	5	—	—	5	5	5
TOTAL	1	10	—	—	11	11	12

Diplomas in Metallurgy

A new scheme for the award of Higher National Diplomas in Metallurgy has been arranged by the Ministry of Education in conjunction with the Iron and Steel Institute, the Institution of Mining and Metallurgy, the Institute of Metals and the Institution of Metallurgists.

The diplomas will be awarded on the successful completion of approved three-year sandwich or full-time courses suitable for students who have had full-time education (including the study of chemistry, physics and mathematics), up to the age of 18, or have been in regular employment for at least two years with concurrent part-time instruction up to Ordinary National Certificate standard in chemistry, physics and mathematics. Rules 111 (1955), which set out the arrangements and conditions for the award of National Certificates in Metallurgy, have been revised to include particulars of the new scheme.

Certificates awarded on completion of courses approved as including specialized instruction in foundry subjects will be countersigned on behalf of the Institute of British Foundrymen. Rules 111 can be obtained by writing to the secretary of the Ministry of Education, Curzon Street, London, W.1.

MR. C. R. HUNT has joined Senior Economisers, Limited, Northumberland House, 303-306, High Holborn, London, W.C.1.

BSCRA Open Days

The British Steel Castings Research Association held "Open Days"* on June 29 and 30, when the Association's doors were open to visitors from 9.30 a.m. until 5.0 p.m. Before the first "Open Day" on June 29, the Association's annual general meeting was held over which Dr. R. Hunter (Clyde Alloy Steel Company, Limited) presided. During the course of his remarks, the chairman referred to the support given by the foundry supply companies, 11 of which had been admitted to associate membership of the Association. He stated that two members had been lost owing to the closure of foundries and one company from the Dominions had been admitted to membership.

New Extension

The chairman referred to the Association's new extension and said that the floor area had been increased by 10,000 sq. ft. and the staff now numbered 72, an increase from the 59 employed during 1958. He stated that a new activity operated jointly by BSCRA and the British Steel Founders' Association was a development committee designed to increase the size of steel-castings sales by the provision and dissemination of data about the mechanical and other properties of the material. More attention also was to be given to the practical implication of research results in the foundry. Among offers of help received from members, one was for assistance with work-simplification studies for fettling and core making, in fact, the support here was almost overwhelming. Rightly, the chairman made an appeal for more-intelligent co-operation from the steelfounders in the matter of the proper study of the research reports by appropriate members of the staff.

Tour of the Premises

A tour of the research station can be usefully started in the "gases-in-steel" laboratory, where an elaborate plant is engaged on the determination of nitrogen in steel by a distillation method, and hydrogen by the diffusion method, operating at 600 deg. C. It clearly shows the reduction in the gas content of steels made in the experimental foundry using a new method developed there.

The foundry building (illustrated in the JOURNAL a few weeks ago) has been enlarged and affords ample space for the interesting range of researches being undertaken. One interesting piece of showmanship is the installation of a telephone which clearly reveals the enormous reduction of noise when fettling on the new bench developed by the Association. Apart from effecting noise reduction, this bench also admits of proper evacuates of the dust produced.

Attractive displays were given on various aspects of the shotblast process and research on the "life" of nozzles has reached the stage of practical application. A discussion the writer had with Mr. Middleton about sand testing revealed that whilst the results given by the conventional testing apparatus are of considerable practical value, much fundamental work still remains to be done.

The melting equipment in the foundry is alike extensive and well chosen. The successful experiments undertaken on sulphur and phosphorus reduction have shown the initial advantage of magnesite furnace-linings as against dolomite, but further work is being undertaken to investigate wider practical applications.

The research-station buildings, including the offices, are well built, of good decor and essentially practical. The visits were well organized; the courtesies invariably exhibited by the Association's staff were greatly appreciated, and everyone attending must have learnt much.

* The full programme of events taking place during the "Open Days" was printed in the June 9 JOURNAL.

British Blast Furnaces in the March Quarter, 1960—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of first quarter, 1960.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	2
Shelton Iron & Steel	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	1	—	—	1	0.6	2
TOTAL	—	4	1	—	5	4.6	7
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	11	59	14	3	87	83.2	114

Weekly Average Number of Furnaces in Blast during the March Quarter, 1960, and the Previous Four Quarters

District.	1959.				1960.
	March.	June.	Sept.	Dec.	March
Derby, Leics., Notts., Northants, and Essex	20	18.8	17.7	17.6	18.8
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	6.9	7	5.8	4.7	6.5
Lincolnshire	8	8	8	8.5	10·0
North-East Coast	17.4	17	15.6	16.1	16·4
Scotland	6	5.8	5	5.8	5·9
Staffs., Shrops., Worcs., and Warwicks.	4.9	4	4	4.6	4·6
South Wales and Monmouth	9.5	9.6	9.6	11	11·0
Sheffield	2	2	2	2	2·0
North-West Coast	7.4	7	6.6	7.4	8·0
TOTAL	82.1	79.2	74.3	77.7	83·2

The following companies have furnaces in course of construction or rebuilding:—Lancashire Steel Manufacturing; Lysaght's Scunthorpe Works; South Durham Steel & Iron Company, West Hartlepool Works.

BRITISH ALUMINIUM COMPANY, LIMITED, are to carry out alterations and extensions to their Falkirk works at an estimated cost of £213,000.

News in Brief

UNITED DOMINIONS TRUST, LIMITED, is opening a new branch office on July 11, at 63 Western Hill, Durham.

A £20,000 ORDER from Czechoslovakia for British Norton motor-cycles, brings the total of orders placed by the Czechs with Norton Motors, Limited, Birmingham, to £60,000 in just over 18 months.

SIFAM ELECTRICAL INSTRUMENT COMPANY, LIMITED, Leigh Court, Higher Lincombe Road, Torquay, Devon, are constructing a new factory and administration block which is scheduled for occupation in the autumn.

AT THE WORKS of David King & Sons, Limited, ironfounders, Carleton Road, Skipton, a dipping pot containing more than 100 gallons of tar caught fire on July 4. The contents of the metal container about 10-ft. dia., were ruined.

FIRE BROKE OUT LAST WEEK in a timber shed at Forth & Clyde & Sunnyside Iron Companies, Limited, Camelon, Falkirk, a foundry in the Allied Ironfounders group. Two sheds, both joiners' workshops, were completely destroyed.

A NEW THREE-STOREY OFFICE BLOCK in Sarah Street, Leicester, is being built for S. Russell & Sons, Limited, founders and engineers, Leicester, at a cost of £90,000. Provision is also to be made for parking facilities for between 90 and 100 vehicles.

LONG-SERVICE GIFTS were presented at the annual staff dinner/dance of the Steetley Company, Limited, Worksop, on July 4, to Mr. S. R. Baker, who has retired after 52 years' service, and to Mr. J. R. Tierney, who has been on the staff for 21 years.

THE STAND of Tube Investments, Limited, at the British Exhibition, New York, was co-winner with that of the Worshipful Company of Goldsmiths in a contest for the best-designed display which had been sponsored by the Worshipful Company of Goldsmiths.

DURING HIS RECENT TOUR of the West Riding, Mr. J. G. Boyd-Carpenter, Minister of Pensions and National Insurance, visited the Express Works, Huddersfield, of Brook Motors, Limited, and the Cleckheaton works of British Belting & Asbestos, Limited.

MR. TOM FIRTH, who succeeded Mr. Ambrose Firth as chairman of the Brightside group of companies, Sheffield, in June, presided over the first sales conference ever called for the whole group at Scarborough on July 1. More than 70 senior executives were present.

THE JOURNAL'S STAFF acknowledge with thanks the calendar sent by CRAVEN BROTHERS (MANCHESTER), LIMITED, Vauxhall Works, Reddish, Stockport. The calendar, which covers the second half of this year and the first half of 1961, carries on each sheet a picture of a large machine-tool made by the firm.

LONG-SERVICE AWARDS to employees of Davy & United Engineering Company, Limited, Darnall, Sheffield, were made for the first time on June 27. On the basis of £1 for each year of service, the awards to 25 employees, presented by Mr. M. A. Fiennes, managing director, amounted to £1,000.

NATIONAL STEEL FOUNDRY COMPANY, LIMITED, of Kirkland, Leven, are to expand. The works are engaged on axle-box production for the railway modernization programme and has work on hand for months ahead. Shortage of skilled turners is a current problem and efforts are being made to recruit to make good this scarcity.

FURTHER ORDERS for British-made tractors and farm implements worth £3,250,000 have been placed with Massey-Ferguson by Industrija Traktora I Masina, one of Yugoslavia's main importing and manufacturing organizations. The terms of the contract call for 5,900 tractors, to be delivered by the end of December, and for implements to the value of £600,000.

CONTRACTS VALUED AT £317,000 have been obtained by the motor and control gear division of Associated Electrical Industries, Limited, for over 20 d.c. motors for use in heavy-duty cranes to be installed at the new Spencer Works near Newport, Mon., of Richard Thomas & Baldwins, Limited. The orders were received through the consultants, the International Construction Company, Limited.

A NEW APPOINTMENT of industrial secretary to the Government of Northern Nigeria has been conferred upon Mr. David Roberts, who will operate from Nigeria House, 41, Buckingham Palace Road, London, S.W.1. Mr. Roberts has been in Nigeria since 1946, and in his opinion there is considerable scope in that country for foundries catering for "engineering services" which can be interpreted as producing anything from a steam cylinder to iron bedsteads.

THE FORMATION of a working party to review the facilities provided in workshops for the blind, and to recommend what changes may be needed to enable them to fulfil their rôle efficiently and economically was announced by the Minister of Labour, Mr. Edward Heath, in the House of Commons last week. The chairman of the working party will be Mr. J. G. Stewart, C.B., C.B.E., Under-Secretary, Ministry of Labour.

THOS. FIRTH & JOHN BROWN, LIMITED, Sheffield, have issued a brochure explaining its senior apprenticeship schemes. It states that these are designed to offer young men who can absorb adequate theoretical and practical training, the opportunity to equip themselves for some of the more senior posts in industry. A basic requirement is a GCE pass at ordinary level in mathematics, physics, chemistry, and English, for those who desire technical apprenticeships.

THE COMBUSTION ENGINEERING ASSOCIATION, 70, Jermyn Street, London, S.W.1, announce that this year's conference will be held at the Hotel Majestic, Harrogate, on November 8 and 9. The theme of the conference will be "Getting the Best out of Coal" embracing boiler plant and industrial furnaces and kilns. Papers will be given on:—Choosing the right coal; operating and maintaining the plant; choosing new plant or extensions to existing plant, and new developments.

STANTON IRONWORKS COMPANY, LIMITED, near Nottingham, has received from its representative in Australia, Stewarts and Lloyds (Distributors) Pty., Limited, an order for 35 miles of 4-in. dia. concrete-lined spun-iron pipes, together with a number of other fittings. The pipes are required by the Metropolitan Water, Sewage and Draining Board, and will be used for water-mains in the Sydney metropolitan area. Deliveries have already started and will be completed within six weeks.

A BID OF £24,500, made in St. James's Sale Rooms, Derby, on June 28, for Brown's Foundry Company, Limited, in Clarke Street, Derby, did not reach the reserve and the premises, covering 9,000 sq. yds., were withdrawn from auction. They are still for sale by private treaty. The closure of the foundry at the end of last year has not affected the company's business in the supply of building materials and fittings, and

the showrooms and premises for this side of the business were not included in the sale.

A CONTRACT for a dredger, worth about £500,000 has been placed with Simons-Lobnitz, Limited, Renfrew, by the Timaru Harbour Board, New Zealand. The dredger, of the bucket-hopper type, will be powered by diesel-electric machinery and have a hopper capacity of 1,000 tons and a speed of 9½ knots. The company has recently completed another order for a dredger, worth about £650,000, for the Lyttleton Harbour Board, New Zealand, and other orders include one dredger for Calcutta and two for British owners.

FOLLOWING COMPLAINTS from residents, plans to clean up the Great Arthur Street area of factory fumes, smoke and dust have been approved by Smethwick Council. Alderman W. H. Perry, chairman of the Public Works Committee, said for some considerable time the Council had been concerned about fumes from cupolas of Dartmouth Auto Castings, Limited. The firm now has in hand a scheme, whereby the gas will pass through dust collectors and then be discharged through a stack 200-ft. high so that the fumes will be better dispersed.

THE 1960 ANNUAL ASSEMBLY of the International Institute of Welding was held by invitation of the Belgian Institute of Welding at Liège, June 13-19. The President of Honour was H.R.H. Prince Albert of Belgium, Prince of Liège. The Assembly attracted more than 700 people from 23 countries and took place at the *Palais de Congrès*, on the banks of the Meuse. The next annual assembly is to be held in New York from April 11 to 18, 1961—these dates overlap with the opening of the Spring Meeting of the American Welding Society, also to be held in New York.

THE SHEFFIELD WORKS of Associated Electrical Industries, Limited (formerly Metropolitan-Vickers), are to make electrical equipment to the value of £1,000,000 as part of a £10,000,000 contract placed by South African Railways for 449 new suburban rail coaches. The total cost of the electrical machinery needed for the coaches is nearly £3,000,000. A substantial part of this will be undertaken by AEI's South African branch, and other work will be done at their Manchester factories. Sheffield will supply traction motors and other equipment; delivery is expected to start about the end of this year.

Recent Wills

PIRIE, CMNDR. W. B., former chairman of A. Kershaw & Sons, Limited, precision engineers, of Leeds, and a director of a number of companies £112,387

BUCKLEY, JAMES, director and works manager of Thomas Robinson & Son, Limited, woodworking and flour provender milling engineers, of Rochdale £31,940

KIRBY, J. H., managing director of the Manchester Dry Docks Company, Limited, and formerly general manager of Smith's Dock Company, Limited £20,713

ELY, M. V., chairman of Foster Transformers, Limited, and Foster Electrical Supplies, Limited, and a former director of the parent company, Lancashire Dynamo Holdings, Limited £82,956

GREEN, G. H., chairman of Eliza Tinsley & Company, Limited, manufacturers of chains and builders' ironwork, of Old Hill (Staffs) and a past president of the Edge Tool Manufacturers' Association ... £206,924

EDWARDS, SIR TRISTRAM, honorary president and former chairman of Smith's Dock Company, Limited, Middlesbrough, director of the Consett Iron Company, Limited, and other companies, and a past president of the Shipbuilding Employers' Federation £3,818

Increases in Capital

SPENCER GEARS, LIMITED, Leicester, increased by £50,000, in 1s. ordinary shares, beyond the registered capital of £50,000.

JENNER ENGINEERING, LIMITED, Hayes (Middx), increased by £1,000, in £1 ordinary shares, beyond the registered capital of £1,000.

S.S.S. GEARS, LIMITED, Isleworth (Middx), increased by £20,000, in £1 ordinary shares, beyond the registered capital of £20,000.

WILKINSON SWORD, LIMITED, London, S.W.1, increased by £300,000, in £1 ordinary shares, beyond the registered capital of £200,000.

CHADBROOK ENGINEERING COMPANY, LIMITED, Luton, increased by £19,900, in £1 ordinary shares, beyond the registered capital of £100.

FAFNIR BEARING COMPANY, LIMITED, Wolverhampton, increased by £349,900, in £1 ordinary shares, beyond the registered capital of £100.

RICHARD SAWDON (ENGINEERS), LIMITED, London, W.1, increased by £9,000, in £1 ordinary shares, beyond the registered capital of £1,000.

HASSIA PACKAGING MACHINES, LIMITED, London, W.C.1, increased by £4,000, in £1 ordinary shares, beyond the registered capital of £1,000.

HENRY TURNER MACHINE TOOLS, LIMITED, London, S.W.17, increased by £9,000, in £1 ordinary shares, beyond the registered capital of £1,000.

MINWORTH METALS, LIMITED, Sutton Coldfield (Warwick), increased by £50,000, in 1s. ordinary shares, beyond the registered capital of £250,000.

MINING & METALLURGICAL AGENCY, LIMITED, London, E.C.2, increased by £40,000, in £1 ordinary shares, beyond the registered capital of £40,000.

A. E. CHALLENGER & COMPANY, LIMITED, engineers, etc., of York, increased by £7,500, in £1 unclassified shares, beyond the registered capital of £2,500.

D. J. PERCIVAL, LIMITED, wire drawers, etc., of West Bromwich, increased by £36,000, in £1 ordinary shares, beyond the registered capital of £18,000.

G. P. WINCOTT, LIMITED, engineers, furnace builders, etc., of Sheffield, increased by £60,000, in £1 ordinary shares, beyond the registered capital of £40,000.

MATTHEWS & YATES, LIMITED, engineers, etc., of Swinton, near Manchester, increased by £60,000, in £1 ordinary shares, beyond the registered capital of £120,000.

RYECROFT ENGINEERING COMPANY, LIMITED, Ashton-under-Lyne (Lancs), increased by £11,0000, in £1 ordinary shares, beyond the registered capital of £4,000.

PETER THOMASON, LIMITED, iron and steel stockholders, etc., of Manchester, increased by £3,000, in £1 ordinary shares, beyond the registered capital of £3,000.

W. J. KENYON & COMPANY, LIMITED, sheet metal workers, etc., of Bolton, increased by £47,000, in £1 ordinary shares, beyond the registered capital of £3,000.

ALGRAPHY, LIMITED, manufacturers of printing machinery, etc., of London, S.E.15, increased by £80,000, in 5s. ordinary shares, beyond the registered capital of £80,000.

HARRIS & BAILEY, LIMITED, coal, coke and building materials merchants, etc., of Croydon, increased by £5,000, in £1 shares, beyond the registered capital of £15,000.

WEST RIDING ENGINEERS, LIMITED, Baildon (Yorks), increased by £17,500, in 9,500 preference and 8,000 ordinary shares of £1 each, beyond the registered capital of £7,500.

SHARP & COMPANY, LIMITED, general and manufacturing engineers, etc., of Bromley (Kent), increased by £40,000, in £1 shares, beyond the registered capital of £10,000.

ANGEL SON & GRAY, LIMITED, iron merchants, ironmongers, etc., of Guildford (Surrey), increased by £40,000, in £1 ordinary shares, beyond the registered capital of £30,000.

STEEL NUT & JOSEPH HAMPTON, LIMITED, nut and bolt manufacturers, etc., of Wednesbury, increased by £200,000, in £1 ordinary shares, beyond the registered capital of £200,000.

GEORGE HUGHES (COBO), LIMITED, engineers, founders, etc., of Birmingham, increased by £2,000, in £1 6½ per cent. cumulative preference shares, beyond the registered capital of £4,000.

HENRY KELLAND & COMPANY, LIMITED, agricultural machinery manufacturers, etc., of Bridgwater (Somerset), increased by £30,000, in £1 ordinary shares, beyond the registered capital of £35,000.

HERBERT MORRIS, LIMITED, engineers and makers of lifting and other machinery, of Loughborough (Leics), increased by £1,000,000, in 10s. ordinary shares, beyond the registered capital of £1,200,000.

FOUNDRY & METALLURGICAL EQUIPMENT COMPANY, LIMITED (formerly Efco Engineering Company, Limited), Weybridge (Surrey), increased by £15,900, in £1 ordinary shares, beyond the registered capital of £100.

BRITISH ROLLMAKERS CORPORATION, LIMITED, Birmingham, increased by £690,847, in 626,987 ordinary and 63,860 5¾ per cent. cumulative preference shares of £1 each, beyond the registered capital of £2,500,000.

NORTH EASTERN IRON REFINING COMPANY, LIMITED, Stockton-on-Tees, increased by £32,368, in 12,368 ordinary and 20,000 10 per cent. redeemable cumulative preference shares of £1 each, beyond the registered capital of £12,386.

Training for Industry

Sir David Eccles, Minister of Education, in a circular sent to all local education authorities, suggests ways in which the education service can co-operate with industry in providing increased opportunities for young people to train for skilled employment.

Based on the advice of the National Advisory Council on Education for Industry and Commerce, the circular sets out three main contributions which local education authorities can make. These are: (1) Increasing provision by secondary schools of extended courses so that young people can stay on to complete a full five-year course; (2) In areas where it is not practicable for all secondary schools to provide extended courses, local education authorities are asked to consider setting up one-year full-time preliminary courses in technical colleges, and (3) technical colleges, in collaboration with both sides of local industry, might develop full-time courses of education and training covering the theoretical and practical work normally carried out in the first year of apprenticeship.

The circular points out that the extended courses in secondary schools will be of particular value in the long run, because of the contribution they can make to the quality of trained technical manpower by providing a broad basis for further study and training through an extended education, including English, and the basic mathematics and science which skilled occupations increasingly require.

Students taking the integrated courses of education and initial apprenticeship training will spend a year pursuing their education and at the same time acquiring the basic skills necessary for the occupation of their choice. The Minister considers that the development of such courses should be particularly useful to small firms who may find it difficult to provide adequate facilities for an increasing number of apprentices and learners except by taking a share in a co-operative enterprise.

Head Wrightson books More Orders

The current year for Head Wrightson & Company, Limited, engineers and iron and steel founders, of Thornaby-on-Tees (Yorks), started with a steadily increasing order-book and, provided steel can be obtained, its various works should be fully employed, states the chairman, Sir John Wrightson. Since profit margins were lower for home and export than in the past, he continues, any increase in profits would be due to greater efficiency and a higher turnover.

The year ended January 31, 1960, was not an easy one for makers of heavy capital equipment, Sir John says, and had it not been for the considerable tonnage of plant and equipment executed in India at Durgapur and for the nuclear power-station at Bradwell, the profit for the year would have been less. As it was group net profit fell from £874,654 to £803,758, after tax of £628,580 (£636,011). The dividend for the year is raised to 14 (13¼ equivalent) per cent.

Referring to nuclear power-plant, Sir John sounded a word of warning on the cost of building such plant. "We are finding that the work being placed by the Central Electricity Generating Board is still not sufficient in volume to recover the rising cost of the specialist engineering staffs and the massive research effort necessary," he said.

THE NORSK JARL, an 8,000-ton oil-tanker, has arrived at Bo'ness in the Forth to be broken up at the Bridgeness yard of T. & W. Ward, Limited.

ISI Translations

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

1566 ULTRASONIC DETERMINATION OF THE SIZE OF DEFECTS. Krautkramer, J. *Arch. Eisenhütt.*, 1959, Nov., pp. 693-703. (£7 15s.)

1585 WELDABILITY OF 13 PER CENT. CR STEELS USED FOR CASTINGS. Pilous, V., and F. Jandos. *Slevarenstvi*, 1959, May, pp. 191-194. (£4 15s.)

1596 ISOLATION AND DETERMINATION OF OXIDE INCLUSIONS IN HIGH-CHROMIUM STEELS AND EXPERIMENTAL ISOLATION OF OXIDES IN 18/8 STEELS. Piper, E., *et al. Radex Rund.*, 1957, Mar., pp. 776-778. (£3 15s.)

1652 ELECTRONIC CRANE WEIGHING SCALES FOR USE IN IRON AND STEEL WORKS. Knüppel, H., and G. Wiethoff. *Stahl u. Eisen*, 1960, vol. 80, Feb. 18, pp. 220-233. (£9 5s.)

1668 EFFECT OF THE METHOD OF DEOXIDATION ON THE NATURE OF THE NON-METALLIC INCLUSIONS AND MECHANICAL PROPERTIES OF STEEL. Mandl, M., *et al. Hutnické Listy* (Prague), 1960, (2), pp. 109-119. (£10.)

1715 DETERMINATION OF TIN AND ANTIMONY IN STEEL. Brháček, L. *Hutnické Listy* (Prague), 1957, (2), pp. 140-141. (£2 15s.)

Translations in course of preparation include:—

1771 SPECTROCHEMICAL MICROANALYSIS OF OXIDE INCLUSIONS ISOLATED FROM STEEL. Ludemann, K-F., *et al. Neue Hütte*, 1960, Apr., pp. 238-244.

The following translations are of papers in the *Proceedings* of the First All-union Conference on the Continuous Casting of Steel (Oct. 1955, Odessa):—

BISI 608 MECHANISM OF HOT-TEARING OF STEEL CASTINGS. Saveiko, V. N. (£3.) 241-251.

BISI 609 POURING TEMPERATURE AND HOT-TEARING. Gruzin, V. G. (£2 10s.) 252-260.

BISI 610 NEW METHOD FOR THE DETERMINATION OF LINEAR CONTRACTION, STRESS, AND THE RESISTANCE OF ALLOYS TO HOT-TEARING. Trubitsyn, N. A. (£1 15s.) 261-266.

IBF Malvern Conference Fund

The following additional subscriptions to the Institute of British Foundrymen's Malvern conference are gratefully acknowledged by the Council of the Institute:—

	£	s.	d.
Previously acknowledged	2,788	13	0
Guest Keen Iron & Steel Company, Limited	10	10	0
Platt Malleable Castings, Limited ...	7	7	0
Heenan Group, Limited (in particular Court Works, Limited)	10	10	0
Total	2,817	0	0

Dorman Long 3½ Per Cent. Interim

The interim dividend of Dorman Long & Company, Limited, is being raised to 3½ per cent. (2⅝ equivalent) in respect of the year to September 30, 1960. A total equal to 8 per cent. on the capital as increased by a 50 per cent. scrip issue was paid for 1958-59. At the time of the capitalization a total of 10 per cent. for 1959-60 was forecast on the increased capital.

Trading results at the iron and steel works showed marked improvement against those for the same period for the previous financial year. Ingot production increased to 1,159,662 (734,793) tons for the half-year to March 31, 1960. Margins at the engineering works were lower and profits were expected to show a reduction.

Raw Material Markets

Iron and Steel

There is no scarcity in the supply of raw materials to the ironfoundries, but consumers show little inclination to carry stocks apart from those essential for uninterrupted production. All grades of pig-iron are easily come by.

The low phosphorus irons, now being produced more plentifully, continue to be taken up by the engineering and speciality foundries in substantial quantities and only in one or two brands does limited production restrict increased deliveries to consumers. The alternative brands now being obtained are, however, adequate to cover these deficiencies, and the foundries have no difficulty in covering their needs. Hematite pig-iron is also in good supply and the refined irons, where required, are readily available.

Requirements of the high phosphorus irons continue on a limited scale and plentiful supplies are available to satisfy demand, which has shown a further reduction by the falling off in the call for castings from the domestic utensil trade. Most producers of high phosphorus iron have fairly good stocks on hand and continue to ship consignments oversea as and when orders can be obtained against the keen competition from makers abroad.

The call for high quality castings from many important industries continues strong, and most of the foundries supplying these, apart from those catering mainly for collieries and railways, are well employed. The schedule of deliveries required by the motor vehicle trade is maintained and high outputs of castings are being obtained by them. These could be increased if suitable additional labour were forthcoming. Good demands for castings are still a feature of the heavy engineering and machine tool trades, power and electrical plant manufacturers, steelworks, and agricultural implement makers.

In the light castings trade a steady demand continues to be made for builders' castings, but the foundries supplying to the domestic equipment trade are not so well employed. All the light foundries are in need of much more work to keep plants fully occupied. The jobbing and textile foundries are fairly well employed, but could undertake more business.

Adequate supplies of foundry coke are available and deliveries are satisfactory, apart from consignments by rail from South Wales to the Birmingham and Staffordshire area. The foundries are able to obtain all the scrap they need and ganister, limestone, and firebricks are plentiful.

The re-rollers continue well employed, and good demands continue to be made for all their products including small bars and light sections. The call for reinforcing rods is heavy. Many of the re-rollers are now much better off for supplies of steel semis. Home steelworks continue to send forward substantial tonnages, and with the imported material which has come to hand including supplies of 2-in. billets, the stocks on hand at the re-rollers are higher than they have been for some time. Here, too, production is adversely affected by the shortage of suitable labour, and thereby extending the period of delivery of orders on hand.

Non-ferrous Metals

Demand for tin is good from all the usual sources, both here and on the Continent, while in the United States the price has edged up to around $1.03 cents a pound. Part of the price rise, however, is no doubt due to the fact that from July 1 the buffer stock manager is precluded from selling metal, below £83 a ton. In anticipation of this rule coming into force, the cash price for tin decisively broke through the £800-a-ton mark. Although stocks continue to rise slowly in LME warehouses, the persistence of the backwardation suggests that most of these stocks are in the hands of the buffer stock manager. The outlook remains good and there is no reason why the price should not go higher.

Copper is a reasonably good market in London, the undertone being helped by a still somewhat confused situation in the Belgian Congo. So far, the granting of independence has been a relatively smooth affair, although there is still the possibility that the situation might worsen in the near future. The recent Liverpool Dock strike was, for a time, a sustaining factor and it was thought that metal stocks would fall sharply. In the event, however, refined copper stocks increased by 82 tons and at the end of last week the total amount of copper in LME official warehouses was 3,440 tons.

In the US the market is showing some improvement and talk of an early price decline in the custom smelter price has now died away and the quotation of 33 cents a pound remains applicable to both custom smelters and producers.

Lead in London is still a weak market and there is nothing in the outlook to suggest that the price will move very far either way from its present level of around £71 a ton. In the US market conditions are fair and the New York spot price is fairly firm at 12 cents a pound.

Zinc in London is a reasonably good market and the supply of the metal is none too plentiful. However, the market is still subject to small selling pressures and the quotation is fluctuating narrowly around £90 a ton. In the US the market is quiet and the price unchanged at 13 cents a pound.

Institution of Production Engineers' Conference

To focus attention on recent technological developments in methods of manipulating metals which do not involve cutting, the Institution of Production Engineers, 10 Chesterfield Street, London, W.1, is organizing a national conference to be held in Brighton from October 12 to 14. A programme of 16 papers is being drawn up and will be presented under the following main headings:— Extrusion techniques; form and spline rolling; precision forging, and sheet forming. In addition to the plenary sessions, which will take place in the Dome and Corn Exchange, delegates will be welcomed by the Mayor of Brighton at a civic reception on the evening of October 12. The conference will end with a presidential reception and dance at the Hotel Metropole.

Ransomes & Rapier Board Changes

Changes are announced in the board of Ransomes & Rapier, Limited, the Ipswich (Suffolk) ball and roller-bearing subsidiary of Newton Chambers & Company, Limited. Col. R. P. W. Adeane has been appointed deputy chairman with Mr. K. E. Walker as vice-chairman. Rear-Admiral R. S. Warne now becomes the managing director of the company.

Mr. S. C. Tyrell has relinquished his duties as joint managing director but retains his seat on the board. Mr. Tyrell became a director of Ransomes & Rapier when that company was merged with Newton Chambers in 1958. He joined Newton Chambers in 1940 and was made a director in 1956 after a period as chief accountant.

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

July 6, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £42 10s. 0d. to £44 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 15s. 0d. to £61 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 20s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 1d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 1d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £80 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr. scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent, C,* 1s. 8½d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 10¾d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 9 6/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £61 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: soft u.t., 100 tons & over, £31 15s. 0d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (1 ton to 10 tons).—Ship plate (N.-E. Coast), £41 12s. 0d.; boiler plates (N.-E. Coast £44 2s. 0d.; floor plates (N.-E. Coast), £43 10s. 0d.; angles (N.-E. Coast), £38 16s. 6d.; joists (N.-E. Coast) £38 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over. £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 17s. 0d.; nickel-chrome, £98 11s. 0d.; nickel-chrome-molybdenum £111 4s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £253 10s. 0d. to £254 0s. 0d.; three months, £243 15s. 0d. to £244 0s. 0d.; settlement, £254 0s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 5½d. per lb.; rods, 273s. 0d. per cwt. basis; 20 s.w.g., 308s. 0d. per cwt.

Tin.—Cash, £809 0s. 0d. to £810 0s. 0d.; three months, £799 10s. 0d. to £800 0s. 0d.; settlement, £810 0s. 0d.

Lead (Refined Pig).—First half July, £71 5s. 0d. to £71 7s. 6d.; first half October, £72 0s. 0d. to £72 5s. 0d.

Zinc.—First half July, £90 0s. 0d. to £90 5s. 0d.; first half October, £89 0s. 0d. to £89 15s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £126 10s. 0d.; rolled zinc (boiler plates), all English destinations, £124 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £105 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0⅝d. per lb.; sheets to 10 w.g., 222s. 0d. per cwt.; wire, 2s. 10⅜d.; rolled metal, 222s. 0d. per cwt.

Brass (Brazing).—BS1400, B3, £175; B6, £226.

Brass (High Tensile).—BS1400, HTB1, £203; HTB2, £223; HTB3, £236.

Gunmetal.—BS1400, LG2, £225; LG3, £237; G1, ½%, £288; G1, 1%, £275.

Phosphor Bronze.—BS1400, PB1 (AID released), £317; BS1400, 90/10/1, £303.

Leaded Phosphor Bronze.—BS1400, LPB1, £244.

Phosphor Bronze Strip, etc.—Strip, 315s. 9d. per cwt.; wire, 4s. 3¾d. per lb.; rods, 3s. 6½d.; tubes, 3s. 6½d.; chill cast bars, solids 3s. 6d.; cored 3s. 7d. (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 0d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 5d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 4d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb; Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £70 0s. 0d. to £70 10s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £261, AB2, £269.

* Average 68-70 per cent.

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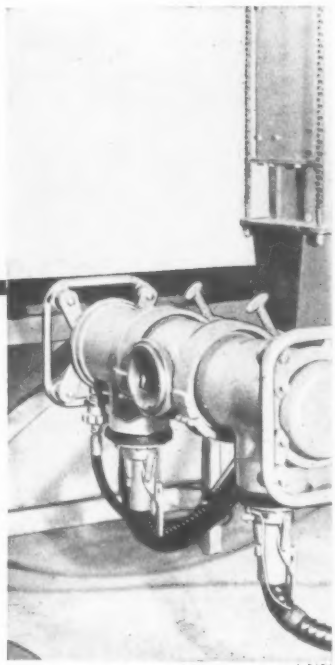

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Publications Received

Accidents—how they can happen and how to prevent them. No. 43. April, 1960. Published for HM Factory Inspectorate by HM Stationery Office, York House, Kingsway, London, W.C.2; price 1s. 5d. post free.

In this issue, unfortunately, accidents occurring in foundries come into the news. First, there is a case in a roll foundry where an explosion occurred. This was caused by water seeping into the casting pit and coming into contact with molten metal which had escaped from the mould. Several employees were burned. The concrete-lined pit went below the general water level, but since the accident, the moisture has been contained by the insertion of a steel tank reaching well above the water level.

The second case described in this booklet deals with the milling of silicate-bonded sand. The accident was due to the over enthusiasm of a man to clean out the mill before it was stationary. The report suggests that the guard on the sand mill should have been interlocked with the gearing to prevent access until the paddles had come to rest.

The third case relates to a fatal accident which resulted from a defective skip used in connection with a cupola-charging machine. When withdrawing the skip from the cupola, it still contained some scrap and, being in unstable equilibrium, it discharged its contents on a man standing at ground level.

The lesson to be learned from an accident during the trials of an experimental moulding-unit is that during such periods extra vigilance is called for.

British Instruments, Second Edition, 1960. Published by the United Science Press, Limited, under the authority of the Scientific Instrument Manufacturers' Association of Great Britain, SIMA House, 20, Queen Anne Street, London, W.1; price £2 5s., post free.

The second edition of this directory and guide for the British scientific instruments industry has been expanded from a total of 615 to 635 pages. A minor modification has been in relation to those concerns which act as selling agents only in the United Kingdom. For any particular item for which they act as agents, their names have been denoted by asterisks. All other names are those of manufacturers.

A classified list of instruments and components is given in section 5. The list of trade names in section 8 indicates the large number of new instruments manufactured and developed in Britain, making it 25 per cent. longer than the first edition. There is again section 1 describing the associations allied to the instrument industry, section 2 listing British Standards Specifications for scientific instruments and components, and a list of consultants, engineers and installers of instrumentation schemes in section 3. Firms able to carry out development work and manufacture prototypes or small batches of instruments to a client's order are detailed in section 4. Foreign glossaries in French, German and Spanish are also included.

Index of Industries and Products with the Government Departments principally Concerned. Obtainable from the librarian, Board of Trade, Horse Guards Avenue, London, S.W.1; price 2s. post free.

The possession of this index can save much time in busy offices as it lists all the commodities in which the Government displays an interest, gives the name of the Ministry concerned, and the abbreviation of the department with which to make contact. The opening pages detail the addresses of the departments and their telephone numbers. For instance, "foundry plant and equipment" is handled by the Board of Trade, through the E.I.D. (Engineering Industries Division), Horse Guards Avenue, London, S.W.1, 'phone TRAfalgar 8855. It should be remembered that all the Ministries are not located in London and for certain services, Scotland and the North of Ireland are separated.

The foundry industry has to deal on occasions with nearly every Ministry, but as there are changes, such as the transference of light-alloy affairs from the "defunct" Ministry of Supply to the Ministry of Aviation, one needs this index to be kept up to date.

Russian Engineering Journal. Cover-to-cover translation from the Russian and published by the Production Engineering Research Association of Great Britain, Melton Mowbray, Leics.; price £8 per annum or 16s. per copy.

Wisely, Mr. D. D. Morgan, the Research Association's information manager sent for review not only a specimen (No. 6, 1959) but also a list of the subjects which have recently been dealt with in this publication. These include: Die-casting machines; pressure-die-casting; plating of magnesium alloys; and an article on a commercial-frequency induction furnace. From the specimen supplied, it is clear the publishers have shown courtesy to their readers by changing metric units into standards readily understood. The articles read well, which is a high tribute to the translator's art and skill.

Nimonic High-temperature Alloys, Engineering Data (sixth edition). Issued by Henry Wiggin & Company, Limited, Thames House, Millbank, London, S.W.1.

The usefulness of this engineering data book is well recognized by those interested in materials capable of operating at very high temperatures. The publication includes tables on mechanical and physical properties, creep characteristics, fatigue and impact properties, and a series of diagrams give detailed data on creep properties in a form convenient to the designer. Data from specimen tests which had been continued for nearly 46,000 hours are published for the first time in this book.

European Coal and Steel Community High Authority—Eighth General Report. Published from Luxembourg.

The general report of the European Coal and Steel Community High Authority details ECSC activities during the past year. The report runs to 450 pages and of great value is the statistical information contained in some 70-odd pages at the end of the book. Production figures show much the same trend as those of this country—supply exceeded demand in the coal industry, and there was a pick-up of business towards the end of the year in the iron and steel business. It is a useful publication to have in the works' library.

School of Welding Technology, Prospectus April to October 1960. Issued by the Institute of Welding, 54, Princes Gate, London, S.W.7.

An exceptionally wide range of courses on the various aspects of welding are listed in this prospectus. The lecturers are largely drawn from outstanding personalities in industry and the professions. Copies of the prospectus are available to readers on writing to Princes Gate.

BELL'S ASBESTOS & ENGINEERING (HOLDINGS), LIMITED—Mr. J. D. Taylor has joined the board. He remains secretary of the company.

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New Catalogues

Mechanical Handling. Four catalogues have been received from J. Collis & Sons, Limited, Regent Square, Gray's Inn Road, London. W.C.1. Catalogue No. 300A, which carries the slogan "it makes the floor move" covers the company's range of industrial trucks. The foundry industry is still lagging behind modern conditions by dumping materials on the floor instead of in boxes or pallets ready for transport by truck, and this leaflet illustrates and describes a very wide range of trucks capable of handling loads of from 1 to 5 tons. Catalogue No. 301 carries another apt slogan, "the ceiling's the limit," and deals with mobile stackers, useful for serving stores. No. 306 deals with the potentialities of modern roller conveyors, the makes in this case being the RolaVeyor, LoadaVeyor, the TransVeyor, VertiVeyor, SlatVeyor and MotaVeyor—each type covering a specific application. The fourth catalogue (No. 322) deals with an all-hydraulic, pallet-type fork-lift truck and four types are illustrated and described.

Automatic Bag Filters. In publication No. 83, W. C. Holmes & Company, Limited, P.O. Box B7, Turnbridge, Huddersfield, cover the potentialities of automatic bag filters with shaking gear. These standard bag filters are being manufactured for less arduous duties than the company's Retroflux design. The filters consist of a cylindrical tower, the lower section of which is formed into a conical hopper through which the collected dust is removed for disposal. The dust-laden air enters the hopper tangentially and the heavier particles are immediately separated out of the air stream by cyclonic action. The finer dust particles rise with the air stream into the filter bags where they are retained by the fabric as the cleaned air passes through.

Shell-moulded Castings and Die-castings. Publication DC/101, of the die-casting department of the English Electric Company, Limited, East Lancashire Road, Liverpool, 10, describes and beautifully illustrate the potentialities of gravity-die, pressure-die, and shell-moulded castings. Not only are the processes well described, but information is also given as to die-making, patternmaking, machining facilities available, and the laboratory and control installations. The catalogue runs to 24 pages and the cover is an excellent example of colour printing, showing the pouring of shell-moulded castings. Moulds are poured on the horizontal plane, using a circular rotating table. This high-grade publication is available to readers on writing to Liverpool.

Rotating-drum Shotblast Machine. A four-page leaflet issued by Baker Perkins, Limited, Bedewell Division, Hebburn-on-Tyne, Co. Durham, is very interesting as it carries a wealth of technical data on the rotating-drum shotblast machine. Known as the Turbo 60, it has been designed for the bulk finishing of small castings and the like. The barrel has inside dimensions of 24½ in. dia., by 28 in. deep. The machine requires 3 h.p. for its operation and for removing dust at 500 cub. ft. per min. ¾ h.p. is needed. For grey iron, the blasting time is quoted as 2 to 4 min., and for malleable and bronze 3 to 6 min.

Fan Engineering. In publication No. 25 (fourth edition), Keith Blackman, Limited, Mill Mead Road, London, N.17, have presented a pictorial survey of the very wide range of equipment they manufacture. In general, the contents of the catalogue are restricted to the "large" and "heavy" units and include centrifugal fans, blowers and exhausters, multi-stage fans, paddle-type fans, clean-air equipment, axial fans and ancillary equipment. The publication runs to 24 pages and carries a good description of the part played by the company's foundries and heavy engineering works in the production of the equipment.

Mobile Cranes. In publication 1/532, Ransomes & Rapier, Limited, Waterside Works, Ipswich, illustrate and describe their model 1520 mobile crane. It loads up to 15 tons and booms up to 80 ft., whilst it is manœuvrable in confined spaces, as it has a 21-ft. 6-in. radius turning circle. Full details are given as to the crane's potentialities.

Nickel/chromium Carburizing Boxes and Pots. In publication V. 41B, Thompson L'Hospied & Company, Limited, Amblecote, Stourbridge, illustrate and (using tables) list the dimensions of the cast nickel/chromium circular carburizing pots and rectangular boxes they manufacture. The range includes 11 sizes of pots and 38 of boxes.

Rubber Gaskets and Tubes. In publication 500360, the Expanded Rubber Company, Limited, Mitcham Road, Croydon, give much data about Rubazote—a form of soft rubber which is water resistant. Full-scale drawings are given of the many sizes of gaskets and thermal-insulation tubes made by the company.

Furnace and Stove Insulation. In data sheet No. 5/60, Stillite Products, Limited, 15, Whitehall, London, S.W.1, have used graphs and tables to set out the thermal insulating properties of their range of mineral-wool slabs of various sizes. These are sold under the trade name of Therbloc.

Boron Products. Borax Consolidated, Limited, Carlisle Place, London, S.W.1, have issued an informative book which deals with the wide range of applications of materials based on boron and borax. It is recorded that no fewer than 50 industries use these materials, their major use in the foundry industry being for vitreous-enamelling thin castings.

House Organs

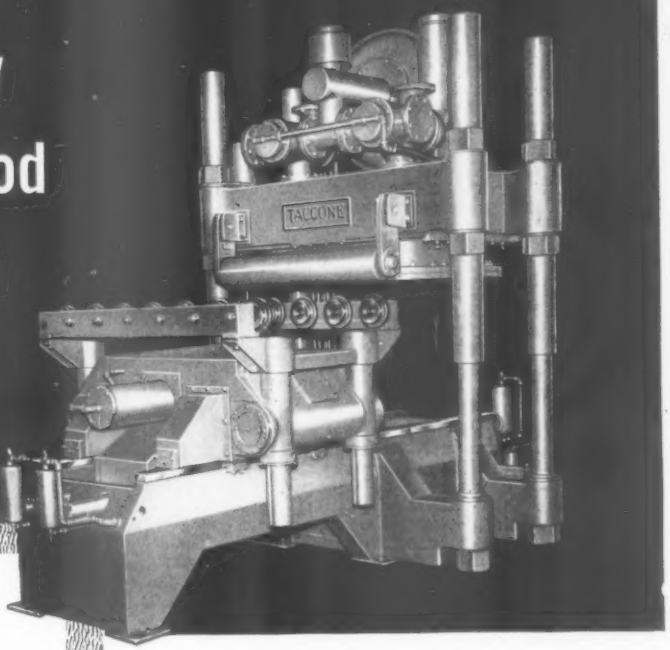
Inco-Mond Magazine No. 14. Issued by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

This issue carries an illustrated description of the world's largest nickel/aluminium-bronze propeller weighing 39 tons and requiring 50 tons of metal to fill the mould. Other articles in the issue cover fertilizer production, the Ornel axial pump, and V-drive marine gears, all of which are lavishly illustrated.

Wiggin Nickel Alloys, No. 55. Issued by Henry Wiggin & Company, Limited, Thames House, Millbank, London, S.W.1.

This issue announces an improved grade of oxidized pig-iron—to be known as Monel pig grade "O"—for the making of Monel nickel/copper-alloy castings. The composition is detailed and recommended melting methods are set out. As usual, the magazine is well illustrated and carries a number of interesting articles—introducing K. Monel for propeller shafts in fast patrol boats, Nimonic 75 in the hottest zone of furnaces and Nimonic 80A in valves for racing-car engines.

An entirely NEW method of Foundry Moulding



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The 'Taccone' machine makes precision green sand pressure moulding available to every foundry. It ensures sound, accurate castings and the moulds it produces are superior to those made by conventional equipment. 'Taccone' moulds are consistently hard and uniform throughout and can be effortlessly produced by unskilled labour.

All types of pattern equipment, including plaster wooden, plastic and metal patterns can be used, and there is practically no limitation on the size of flask employed. 'Taccone' machines are handling flasks 8ft. by 8ft. (larger sizes are envisaged) and already over 200 'Taccone' installations are in operation.

The dimensional accuracy and finish on the castings is comparable with work produced by shell moulding techniques.

The 'Taccone' is more than a machine, more than a process—it is a revolutionary system for rapid mould production.

Ten standard machines are available in the manufacturing range and special machines can be built to any size for any purpose.

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Company News

IMPERIAL CONTINENTAL GAS ASSOCIATION, LIMITED—The company's holding in James Stott & Company, Limited, has been sold to Glover & Main, Limited, for £970,830.

CHARLES S. MADAN & COMPANY, LIMITED, engineers and non-ferrous metal founders, of Altrincham (Ches)—The share capital has been acquired by Adamant & Western Engineering Company, Limited, Luton (Beds), by the issue of 141,935 ordinary 5s. shares and £165,000 in cash.

NEWALL ENGINEERING COMPANY, LIMITED, machine-tool and measuring-instrument makers, of Peterborough—It is proposed to issue 500,000 new 2s. Ordinary shares to holders on a one-for-four basis at a price to be determined, and negotiations are proceeding for privately placing £200,000 debentures.

LAPORTE INDUSTRIES, LIMITED—An offer has been made to acquire the ordinary and 5 per cent. cumulative preference shares of Peter Spence & Sons, Limited, makers of heavy chemicals and organic titanium compounds, of Widnes (Lancs). The total cash consideration amounts to about £2,500,000. The board of Spence & Sons has recommended acceptance.

HARPER ENGINEERING & ELECTRONICS, LIMITED, aircraft engineers, of Exeter (Devon)—Accounts to June 30, 1960, are expected to show a trading profit of not less than £1,100,000. An interim dividend of 40 per cent. has already been declared payable on July 30, and the directors expect a total of at least 80 per cent., against a single payment of 30 per cent. last year.

CAMBRIDGE INSTRUMENT COMPANY, LIMITED—A share exchange offer worth about £600,000 has been made for the ordinary capital of Electronic Instruments, Limited, a private company, of Richmond (Surrey). The basis of the offer is seven Cambridge Instrument 5s. ordinary shares for every three of EIL's 185,000 £1 ordinary. The EIL directors recommend acceptance.

JOHNSON, MATTHEY & COMPANY, LIMITED, gold, silver, and platinum refiners, etc., of Birmingham—The ordinary dividend for 1959-60 is raised with a final payment of 9 per cent., making a total of 12 per cent., compared with the equivalent of 8 per cent. for 1958-59 allowing for the one-for-two scrip issue. Group net profits advanced to £960,130 (£828,282), after tax of £965,159 (£627,627).

JOHN THOMPSON, LIMITED, combustion and general engineers, of Wolverhampton—Orders on hand at the end of 1959 amounted to £29,430,000 and by the end of March, 1960, had risen to £31,370,000, states the chairman, Sir Edward Thompson. Orders booked during the six months ended March, 1960, at nearly £20,000,000, were more than double those of the corresponding six months of a year earlier. Sir Edward states that the improvement in orders will not materially improve the current year's results.

FIRTH CLEVELAND, LIMITED—Final dividend of 17½ per cent. makes 27½ per cent. for 1959 against the 24 per cent. forecast in the July, 1959, share offer. There was no payment in the previous 14 months. Group net profits rose from £971,336 to £1,201,013, after tax of £928,825 (£872,409). Firth Cleveland-Laing, Limited, has been registered as a private company with an authorized capital of £25,000 in 4s. shares to acquire rights with a view to the exploitation of the inventions of Herr Nikolous Laing in the field of aerodynamics.

Law Cases

British Oxygen's Claim fails

In a 12,000-word judgment in the Court of Session Lord Guest has absolved the South of Scotland Electricity Board and the British Electricity Authority from two actions raising important principles governing the method of charging for supply of high-voltage current to industrial consumers. The actions were brought by the British Oxygen Company, Limited, and British Oxygen Gases, Limited which in 1955 purchased from British Oxygen, Limited, the whole of its undertaking at Hillington and Polmadie.

Both companies alleged that, in charging for supply to the two premises, the South-West Scotland Board, and since 1954, the South of Scotland Board, exercised undue discrimination against industrial users of electricity (including the plaintiffs) metered at or above 6,000 v.

Lord Guest said that following a House of Lords' judgment a proof was allowed on averments that the least differential in unit charge which could be given without unduly discriminating against the plantiffs was 5.55 per cent. increasing as the cost of fuel increased.

Burden of Proof

Whether discrimination was undue was a question of degree and the burden of proof rested on the plaintiffs. The main body of evidence led for the plaintiffs sought to establish that from the point of view of cost of supplying to the consumer, the differential as between high- and low-voltage consumers was inadequate. If 5.55 per cent. was the proper differential, this was far from establishing that it was the minimum differential. In his opinion this figure could not be taken as a proper differential which the Boards were bound to write into every tariff.

The differential was on the basis of a price of coal of 38s. per ton, which was a national price. During the period in question the price never fell below 61s. 10d. and to ascertain the true differential it was necessary to look at the actual price of coal.

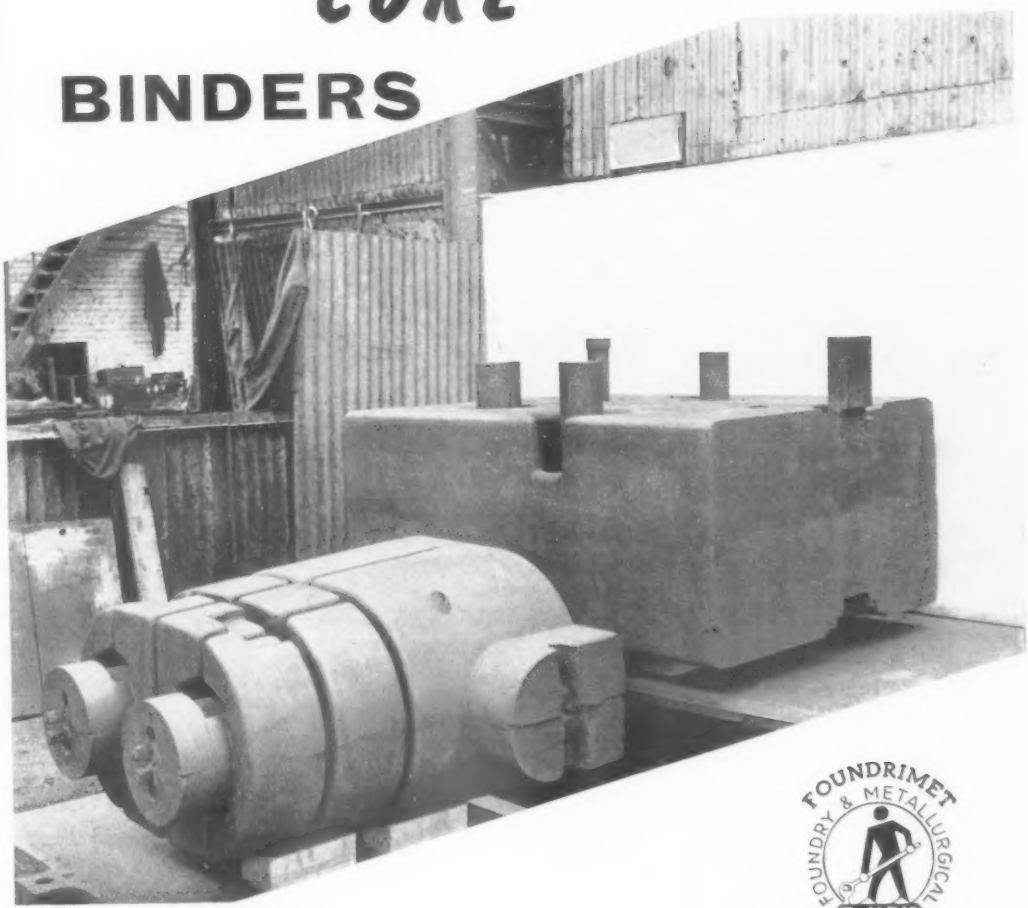
Rejecting a claim by British Oxygen Gases that, in respect of a fourth tariff, it had suffered undue discrimination, Lord Guest said it appeared an impossible proposition that the pursuers should be able to dictate to the defendants the form of tariff which they should be offered and that the defendants should be bound to give them the alternative of an annual maximum demand charge without altering the money content in the monthly charge.

£2,250 Damages for loss of Eye

Damages of £2,250 were awarded to Mr. Robert Marshall, an employee of Babcock & Wilcox, Limited, Renfrew, for the loss of the sight of his right eye in an accident which occurred at the works in May, 1956. The action took place before a jury sitting with Lord Guest in the Court of Session.

Marshall said that when ladling metal into a casting bed, it had suddenly shot up into his face, striking his right eye and destroying its sight. He claimed his employers should have provided him with eye-shields. The firm denied liability and contended that visors and eye-shields were unsuitable for the type of work on which Marshall had been engaged. They said that metal flying upwards could enter the space between the visor or eye-shield and the wearer's face. Marshall, they submitted should have worn the goggles issued to him.

SUPINOL CORE BINDERS



Photograph of cores weighing approx. 35 cwts by courtesy of Seagers Ltd. Dartford.

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Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

POSITION as Sales Manager or Representative required. Fifteen years' successful management Bronze and Aluminium Foundry in the Midlands. Experienced machine and shell moulding. Box PO728, FOUNDRY TRADE JOURNAL.

REPRESENTATIVE with foundry experience wishes to represent a foundry for non-ferrous and cast iron in London and Counties. Geed personal connection. Commission and part expenses. Box RE726, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE, age 33, connections in the south, seeks position with reputable foundry. Box TR714, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

IRON FOUNDRY TECHNICIAN required for six months in small Foundry, important town North Spain. INDUSTRIAL ALONSO, Apartado 336, Gijón (España).

SITUATIONS VACANT—*contd.*

CASTER required for pouring brass and gunmetal. Top wages and bonus. House provided for suitable man. Midlands area. Box CR707, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER for Iron and Non-ferrous Jobbing Foundry, Birmingham Area, with capacity up to 30 tons per week.

Applicant should be between the ages of 35 and 45 and should have had previous experience in management relating to supervision of labour, ratefixing, estimating, quality control, development of modern methods, production and cost control, for which he will be responsible.

Preference will be given to applicant with working experience of the district.

Salary according to experience. The Company operates an attractive contributory Pension Scheme. Assistance with house purchase if required. Box FM696, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

FOUNDRY MANAGER required for Grey Iron Jobbing Foundry in North Manchester area. Weekly production 5 tons. Practical man with experience of plate and loose pattern work, sand and metal control essential. State age and experience. Box FM700, FOUNDRY TRADE JOURNAL.

WORKING CHARGEHAND required for Non-ferrous Foundry in the south of England. This position is permanent and progressive for the right man, and arises as the result of promotion inside our organisation. Write stating age and experience to FOUNDRY MANAGER, Box WC712, FOUNDRY TRADE JOURNAL.

WELL-KNOWN FOUNDRY SUPPLY ORGANISATION HAS A VACANCY FOR A REPRESENTATIVE IN SCOTLAND

APPLICANTS should have a good knowledge of the Foundry Industry, preferably coupled with selling experience. After an initial period of training the successful applicant will take over an established territory in Scotland. Opportunities for promotion from this position are good and only candidates of proven ability and good personality need apply. Box WK705, FOUNDRY TRADE JOURNAL.

ASSISTANT MELTING SHOP MANAGER

A.P.V.-PARAMOUNT LIMITED wish to make this new executive appointment prior to the coming into operation this Autumn of major extensions to the furnace plant serving their Crawley steel foundries.

Applicants must have had either high frequency or arc melting experience, preferably with previous laboratory training and be 25/35 years of age.

The appointment offers attractive starting salary, with due recognition given to any technical qualification, and provides above average scope for the future for an individual of ability. The appointment is permanent and pensionable, and provides excellent working and living conditions in the South of England, where assistance with housing can be given.

Applications to the Personnel Manager,
A.P.V.- PARAMOUNT LIMITED,
Manor Royal, Crawley, Sussex.

BRASS FOUNDRY FOREMAN

Required for Non-ferrous Foundry in Birmingham. Applicant must have practical and Supervisory experience in semi-mechanised production. Excellent prospects for suitable applicant.

Write giving full details to :—
PERSONNEL MANAGER,
BOX No. BF 693.
Foundry Trade Journal

AIC Executive Selection Service

is advising on the following appointment

GENERAL FOUNDRY MANAGER

for a fully mechanised light castings iron foundry. Applicants must be technically trained and, having had experience of directing all operations on the shop floor, as a Foundry Superintendent, have subsequently filled a position of senior technical and managerial responsibility.

The appointment carries full responsibility for the mechanical production of up to 100 Tons per week of range and grate castings, together with the opportunity to develop and expand to a high production, a limited range of high quality precision castings. Training in metallurgy, experience of special irons, and practical experience or a keen interest in shell moulding will be advantageous.

Preferred age 28-40 years. Minimum salary envisaged £1,750 per annum with use of Works car and participation in a non-contributory pension scheme.

Brief written applications should be sent, in complete confidence, to Mr. D. Richardson (1038) at Associated Industrial Consultants Limited
BUSH HOUSE LONDON WC2

Associated Industrial Consultants

CHIEF FOUNDRY METHODS ENGINEER

required by The North British Steel Foundry Limited, BATHGATE, Scotland. The Company operates a modern steel foundry producing castings up to 10 tons in weight. The position calls for a man having a wide experience in the application of modern steel foundry techniques and in the running of a Methods Department. A salary commensurate with experience will be paid, and assistance with housing will be considered. There is a Pension Scheme in operation.

Applications, in writing, should give details of experience, age, education, etc.

The Secretary,
The North British Steel Foundry Limited,
Balbardie Steel Works,
Bathgate, Scotland.

SITUATIONS VACANT—*contd.*

REQUIRED for India: Non-ferrous foundry TECHNICIAN, about 30 years of age. Must have experience in copper base alloys in Sand, and die casting with metallurgical background. Also must have minimum two years' experience in a managerial position in modern Foundry and conversant with modern practices. Attractive salary and excellent prospects for further advancement. First class passages paid—generous leave terms. Reply: Box RE718, FOUNDRY TRADE JOURNAL.

EXECUTIVE, with general Foundry experience, required for Managerial Post in London Die Casting Foundry. This position offers prospects of appointment to Board. All our staff have been informed of this advertisement. All applications will be dealt with in the strictest confidence. Box EW727, FOUNDRY TRADE JOURNAL.

A YOUNG DESIGN DRAUGHTSMAN is required to develop schemes for Foundry Mechanisation. Applicants must have a wide knowledge of the design of Sand Handling Equipment and be capable of working with the minimum of supervision. Write, stating full details of experience and salary required, to THE SECRETARY, Foundry Plant Division, Richards Structural Steel Co., Ltd., Leicester.

CHIEF PLANNING ENGINEER required for Investment Foundry at Redditch. He will be responsible for design and manufacture of dies and tools as used in the "lost wax" process. Components vary from turbine blades to general commercial work. Drawing Office and Toolroom experience necessary. H.N.C. an advantage. Preference given to applicants with experience in die design for Investment Foundry or Diecasting applications. Full details of experience and positions held should be sent and all applications should indicate salary required. Box CP719, FOUNDRY TRADE JOURNAL.

ASSISTANT FOUNDRY FOREMAN, age 28-35, required for large foundry on Merseyside. Sound technical background essential plus ability to supervise labour and organise production. Staff appointment, pension scheme, good opening for progressive man. Apply with full particulars and salary expected to GENERAL MANAGER, c/o Box AF720, FOUNDRY TRADE JOURNAL.

FOUNDRY TECHNICIAN required, age 26-35. Should have basic training and good technical education including laboratory experience. Experience in copper based alloys essential and the ability to undertake investigations and initiate original development work in the foundry a principal requirement. Salary range £1,000 to £1,200 p.a. Write stating age, qualifications and experience to GENERAL MANAGER, c/o Box TF721, FOUNDRY TRADE JOURNAL.

FOUNDRIES FOR SALE

FOR SALE. Malleable Ironfoundry and Engineering Business, old established with good connections. Would consider partnership with firm able to bring foundry labour to make castings for their own requirements. Freehold property with room for expansion. For further information write Box MA717, FOUNDRY TRADE JOURNAL. Reason for sale, owners wish to retire. Opportunity for firm wanting additional works. Midlands.

FREEHOLD compact Foundry available in East Midlands for sale. REASONABLE OFFERS for IMMEDIATE SALE considered. Write Box FC724, FOUNDRY TRADE JOURNAL.

BUSINESS OPPORTUNITIES

EXPERIENCED IMPORTER of British Foundry Equipment and Supplies looking for worthwhile items to add to the line he is presently importing from U.K. to U.S. Reply to Box EI670, FOUNDRY TRADE JOURNAL.

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WANTED.—Sand Mill in good condition, pan about 4 ft. diameter, suitable for 3 phase, A.C., 400 volt. Box WA676, FOUNDRY TRADE JOURNAL.

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18 × 12 × 4 × 7
24 × 24 × 5 × 8
30 × 22 × 6 × 4
21 × 14 × 4½ × 7
Box ST730, FOUNDRY TRADE JOURNAL.

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PNEULEC 6 ft. dia. with Bucket Elevator, Rotary Sieve, Skip Loader, 3/50/400 V.
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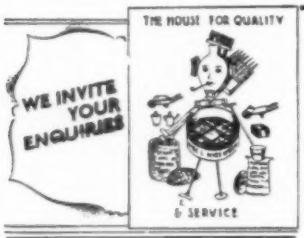

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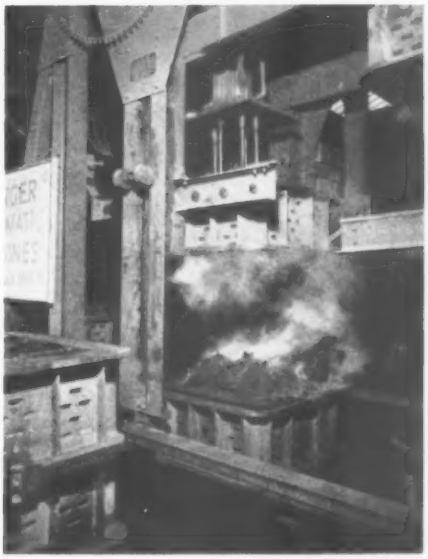

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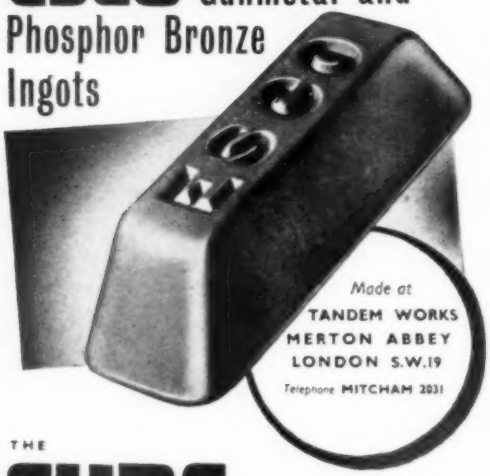

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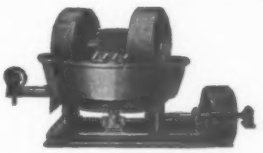

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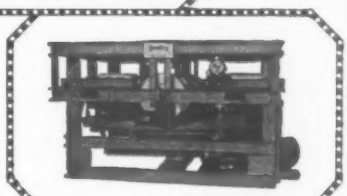

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